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05

Non-wood forest products for people, nature and the green economy. Recommendations for policy priorities in Europe

A white paper based on lessons learned from around the Mediterranean

Inazio Martínez de Arano,
Sara Maltoni,
Alvaro Picardo,
Sven Mutke

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Lukas Giessen[1]
Editor-In-Chief

Sarah Adams
Managing Editor

Inazio Martinez de Arano
Associate Editor

The editorial office can be contacted at
k2a@efi.int

[1] Technical University Dresden, Germany

Layout: Lina Salamanca

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Lead authors
Inazio Martinez de Arano[1], Sara Maltoni[2], Alvaro Picardo[14], Sven Mutke[3].

Contributing authors
Joana Amaral Paulo[4], Moktar Baraket[5], Haïmad Baudriller-Cacaud[6], Raphael Bec[6], Jose Antonio Bonet[7], Anton Brenko[8], Dino Buršić[8], Benjamin Chapelet[6], Alexandra Correia[4], Roser Cristobal[7], Gabriel Ducos[6], Liliana Fernandez[9], Florian Galinat[6], Lamia Hamrouni[5], Henri Husson[6], Mariem Khalfaoui[5], Steven Libbrecht[10], Nikos Markos[11], Giulia Muir[15], Maria Pasalodos[3], Olivia Marois[6], Nicola Andrighetto[12], Jacopo Giacomoni[12], Aida Rodriguez[9], Roberto Rubio[9], Conceição Santos Silva[13], Simona Sorrenti[15], Kalliopi Stara[11], Paula Soares[4],Ibtissem Taghouti[5], Margarida Tome[4], Enrico Vidale[12], Sven Walter[15].

Reviewers
Piotr Borkowsky[16], James Chamberlain[17], Davide Pettenella[18], Eduardo Rojas[19].

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[10] ESSET
[11] UOI
[12] ETIFOR
[13] UNAC

Other affiliations

[14] Junta de Castilla y León
[15] FAO
[16] EUSTAFOR
[17] USDA Forest Service
[18] University of Padua
[19] Universitat Politécnica de Valencia

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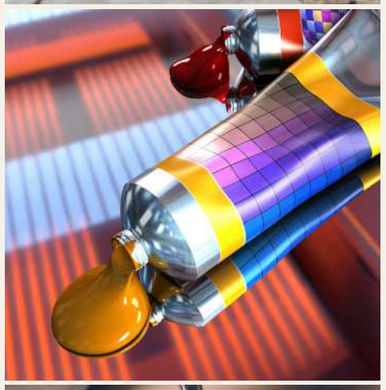
Executive Summary

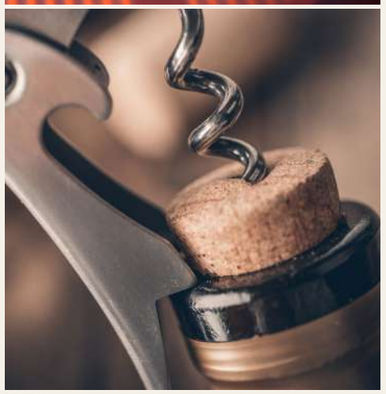
Non-wood forest products (NWFP) are a multifaceted part of Europe's cultural legacy. From cork to natural resins, from mushrooms to medicinal plants, and the many varieties of nuts and berries, NWFP are an intrinsic part of daily living.

They contribute to human health and well-being and to the achievement of the United Nations' *Sustainable Development Goals*, particularly to the social and cultural dimension (SDG1 — No Poverty, SDG2 — Zero Hunger, SDG3 — Good Health and Well-being), the environmental dimension (SDG13 — Climate Action, SDG15 — Life on Land), and to the economic dimension (SDG8 — Decent Work and Economic Growth, SDG9 — Industry, Innovation and Infrastructure, SDG12 — Responsible Consumption and Production).

The current and especially the potential future economic value of NWFP largely go unnoticed in official statistics and foresight analysis, as many NWFP are part of the informal economy and not properly accounted, or are registered as agricultural products in official records. A pan-European survey conducted in 2015 estimated the value of NWFP collected in Europe at €23 billion per year, of which some €3.4 billion are marketed through formal and informal channels. This ranges in the same order of magnitude as the total revenues from roundwood. In addition, Europe is a central player in international trade of NWFP, importing €4.2 billion (50% of the global imports) and exporting €3.4 billion (40% of global exports). Moreover, NWFP are embedded in daily life: 90% of European households regularly consume NWFP, while 26% collect some type of NWFP at least once a year, for self-consumption or sale. More than 60 million European foragers, often organised in associations, take part in these activities. The positive impacts in public health and well-being of these outdoor and traditional activities, although unmeasured, is difficult to overestimate.

Therefore, NWFP represent an unrevealed source of nature-based solutions that can significantly contribute to Europe's policy priorities within the European Green Deal (2019). The ongoing policy processes to which NWFP can substantially contribute include the EU Climate Action, the Common Agricultural Policy post 2020, the New Industrial Strategy for Europe 2020, the European Biodiversity Strategy 2020, the Pharmaceutical Strategy for Europe 2020, the EU Farm to Fork Strategy, the EU Forest Strategy, and the EU Action to Protect and Restore the World's Forests (2019).





In the light of this potential, however, NWFP face risks and threats. These are posed by both global and local challenges such as climate and land-use changes, uncontrolled harvesting, inadequate management, and illegal trade, along with tight market competition with fossil-based or non-renewable alternatives. These risks are exacerbated by the lack of systematic knowledge related to, among others, resource levels (distribution, productivity), harvesting and cultivation techniques, domestication, and official, reliable data on production, consumption and trade. This gap in knowledge, is also reflected in the lack of adequate regulations and management, correct definition of production methods, appropriate labelling and quality standards, ultimately affecting product transparency and safety.

Based on the analysis of risks and limitations, the white paper stresses the urgent need for action and identifies promising policy options proposed to be considered based on the specific regional, national or subnational circumstances to: i) secure the conservation and sustainable supply of NWFP; ii) build competitive, equitable and sustainable value chains; iii) improve transparency, data and information flow on NWFP and iv) establish enabling conditions in policy, financial and innovation terms.

It is a call for policy action on different scales: to the European Commission to promote coordinated regional, national and subnational programmes which improve reporting for high relevance NWFP and encourage traceability, labelling and standards for NWFP, especially valorising information about collection and production processes; to national or subnational authorities to adopt innovative fiscal and labour regimes and implement traceability systems where appropriate; to sectoral organisations and companies to increase transparency of price setting and encourage vertical and horizontal collaboration along the NWFP value chains; and to the United Nations, international organisations and academia to support countries and stakeholders to carry out the above key actions, including the collection and dissemination of data and statistics on NWFP.

SUMMARY OF POTENTIAL POLICY ACTIONS PROPOSED TO LEVERAGE NWFP

SUPPLY SECURE THE CONSERVATION AND SUSTAINABLE SUPPLY OF NWFP

3.1.1 Enhance the resource base

- Focus on active forest management of existing forests
- Embrace multi-functional forest management to enhance NWFP production
- Recognise the strategic importance of agroforestry habitats
- Support long-term investments into forests through appropriate instruments
- Explore the role of domestication, to secure supply of most demanded NWFP

3.1.2 Ensure sustainable harvest levels and fair access to the resource

- Guarantee fair, predictable and transparent access to forest resources
- Regulate and respect harvest rights for NWFP
- Establish adequate and realistic responsibilities and control procedures
- Train workers and collectors of NWFP adequately
- Build capacities on NWFP into renewed forest and agricultural advisory services

3.1.3 Set up and improve monitoring systems and inventories

- Embed NWFP resource assessment in National Forest Inventories
- Support resource assessment of NWFP at European, national and sub-national scales
- Establish innovative procedures to record information on collection and trade
- Invest in research and development of NWFP assessment and monitoring

VALUE BUILD COMPETITIVE AND EQUITABLE VALUE CHAINS

3.2.1 Develop innovative and territorial value chains

- Favour co-management of public forests
- Support territorial value chains and local networks
- Realise synergies with tourism in territorial development strategies
- Promote new business models and downstream integration
- Support certification for quality, origin and sustainability
- Incorporate systems of Payments for Environmental Services

3.2.2. Design and adopt innovative fiscal and labour regimes

- Define clear boundaries on who the producers are
- Adopt innovative fiscal regimes
- Adopt adequate labour policies to tackle seasonality and undeclared work
- Contractualise the relationships between landowners and collectors

3.2.3 Strengthen equitability and the role of producer organisations

- Increase transparency of price setting
- Support price observatories, linked to product quality standards
- Stimulate, strengthen and involve producer organisations and cooperatives

INFORM PROVIDE TRANSPARENCY, DATA AND INFORMATION FLOW ON NWFP

3.3.1 Improve visibility of NWFP

- Establish databases with priority, high relevance NWFP
- Improve NWFP reporting or accounting in International Statistical Classifications Systems
- Integrate NWFP in individual/ household consumption surveys
- Complement information by targeted sectoral and market surveys

3.3.2 Ensure traceability and encourage innovative labelling

- Enforce compliance of edible NWFP with food traceability and labelling requirements
- Establish legal standards and due diligence systems
- Encourage voluntary certification and quality standards
- Inform and educate consumers through guarantee of origin
- Leverage the potential of mobile ICT solutions for labelling and traceability

3.3.3. Facilitate access to data and market information

- Promote studies of costs, rents, trade, and prices for NWFP production systems
- Promote knowledge sharing through good practice guidelines and ICT platforms

ENABLE CREATE ENABLING CONDITIONS

3.4.1 Increase policy coherence across all relevant policy domains

- Work towards a consistent approach to nature and landscape conservation
- Comprehensively reveal the social and ecological dimensions of NWFP
- Support compliance with food and chemical safety regulations
- Establish a level playing field that implements sustainable and circular economy approaches
- Adapt the Common Agricultural Policy to better support NWFP conservation and development
- Develop coherent programmes for key NWFP sectors at different scales

3.4.2 Improve financial support

- Define eligibility for NWFP and agroforestry land in the CAP direct payments
- Promote integrated approaches related to rural development programmes
- Adjust rural development funds and direct payments
- Better support NWFP within existing programmes and available funding sources

3.4.3 Foster innovation, knowledge transfer and extension capacity

- Build a systemic approach to promote innovation
- Increase research attention to the social-ecological dimensions of NWFP
- Develop capacities in rural development agencies Strengthen forest advisory services
- Increase the attention given to NWFP in vocational training schools

Photo by: © lunamarina / Adobe Stock

AIM OF THE WHITE PAPER

1. Aim of the white paper

In many regions of the world, non-wood forest products (NWFP) — such as cork, resins, gums, wild mushrooms, aromatic and medicinal plants, and wild nuts and berries – contribute to well-being in many different ways. They complement family income, especially in low-income households, they contribute to food security and nutrition, and they are an important source of medicinal remedies. They are also part of cultural heritage and spiritual life.

Being sourced from natural areas, forested landscapes and managed forests, their production and collection is intimately related with land management and biodiversity conservation. Unfortunately, for most NWFP, information on their collection, production, trade and use, remains scarce and fragmented.

In Europe, the available information hints at an, as yet, unrealised potential for a rich array of NWFP. The market value of amateur NWFP collection has been estimated at €23 billion per year, most of it for self-consumption. This is in the same order of magnitude as the total value of marketed roundwood. Only a fraction of this is marketed through formal and informal channels, yet it may provide over 10% of the total income to 4.5 million households[1]. NWFP sustain industrial value chains in cork, green chemistry, gastronomy, and pharmaceuticals, and multiply their economic impact as drivers of tourism. Just as importantly, they are intimately related with leisure, and people's relationship to nature.

The multi-faceted importance of NWFP points towards their much greater future potential, especially when a more sustainable, fair, and nature-based development path gains political momentum, social support and market drive. Paradoxically, NWFP are generally perceived to have low economic value, overlooked in sectoral policies and even relegated to a secondary — non-wood — role in forest regulation and management practices across the continent.

This white paper is a call to recognise, and to leverage, the potential of NWFP to contribute to policy priorities in Europe, especially in relation to rural development, nature conservation, and human well-being. It shows how leveraging NWFP potential could contribute to the successful implementation of the European Green Deal, and to a greener and more sustainable post-COVID economy restart. Furthermore, realising NWFP potential could contribute significantly to achieving

[1] Lovrić et al., 2020. https://doi.org/10.1016/j.forpol.2020.102175

Focus 1.

Non-wood forest products: an unsettled definition

"… goods of biological origin other than wood, derived from forests, other wooded land and trees outside the forest"

(FAO, 1999) [7]

"… Any raw or processed product, excluding wood, that is produced from an indigenous or wild biological resource found within forests and woodlands and that is harvested for either domestic consumption or trade. In some instances, the resource may be cultivated or sourced from modified or non-natural systems (as for some edible leafy plants), but cannot be regarded as a conventional agricultural crop"

(SHACKLETON ET AL. 2010) [8]

"… goods derived from forests that are tangible and physical objects of biological origin other that wood"

(FAO, 2015) [9]

"wild and semi-wild non-wood forest species and products thereof, as well as products in the early stage of domestication […] and with reference to specific services related to NWFP […]"

(WOLFSLEHNER ET AL., 2019) [10]

the UN Sustainable Development Goals. The white paper thus identifies key areas that require urgent policy attention and suggests concrete actions that could be undertaken by decision makers, key stakeholders, and societal actors at global, regional, national, and subnational scales in Europe and other parts of the world.

The findings and recommendations included here stem, mainly, from multi-stakeholder interactions and lessons learned from across the Mediterranean basin within the initiatives of the EU-funded H2020 *INCREDIBLE Thematic Network*[2], and the capitalisation of previous research carried out by the Seventh Framework Programme project *StarTree*[3] and the COST ACTION FP1203 (European non-wood forest products network)[4], and has received valuable inputs from the IUFRO (International Union of Forest Research Organizations) *Task Force on Unlocking the Bioeconomy and Non-Timber Forest Products*[5]. Together, these projects represent a comprehensive effort to understand and support the sustainable use of NWFP, involving several hundred researchers, practitioners, forest owners, NWFP processors, and other experts.

In 1999, FAO defined NWFP as "…products [that] consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests" (Focus 1). This white paper specifically addresses plant- and mushroom-based NWFP (namely wild nuts and berries, wild mushrooms and truffles, aromatic and medicinal plants, cork, natural resins), with particular attention given to food products, after the recommendations from the Committee on World Food Security (2017) and the Global Forest Experts Panel (GFEP, 2015) on the contribution of forests to food security and nutrition[6]. Nevertheless, many of the issues discussed here also apply to animal-based products (game, wild meat, honey) and grazing, and to some intangible forest ecosystem services. In fact, they affect other products, not coming from forests, but from other habitat types, like high mountains, tundra, deserts, wetlands, rangelands, or coastal areas. Although this white paper has a strong Mediterranean flavour, its insights and recommendations are also valid across Europe and other regional contexts.

[2] https://incredibleforest.net
[3] https://star-tree.eu
[4] COST Action on Non Wood Forest Products https://www.nwfps.eu
[5] https://www.iufro.org/science/task-forces/bioeconomy-and-non-timber-forest-products
[6] http://www.fao.org/3/i3710e/i3710e.pdf
[7] http://www.fao.org/3/x2450e/x2450e0d.htm#fao%20forestry
[8] Shackleton, S., Cocks, M., Dold, T., Kaschula, S., Mbata, K., Mickels-Kokwe, G. and Von Maltitz, G. 2010. Non-wood forest products: Description, use and management in E. Chidumayo and D. Gumbo (eds.) The dry forests and woodlands of Africa: Managing for products and services. Earthscan, London.
[9] http://www.fao.org/3/a-i4793e.pdf
[10] https://www.efi.int/publications-bank/non-wood-forest-products-europe-seeing-forest-around-trees

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THE POLICY RELEVANCE OF NWFP: UNVEILING THE INVISIBLE

2. The policy relevance of NWFP: unveiling the invisible

NWFP are part of Europe's natural capital and cultural legacy. They contribute in many different ways to human health and well-being. They are also important natural resources that support sustainable bioeconomy value chains, green jobs, and the creation of reduced carbon-footprint and renewable products. Yet this significant contribution and the role of NWFP in providing a myriad of nature-based solutions to today's challenges is frequently under- or un-reported.

NWFP provide opportunities to advance towards the Sustainable Development Goals (SDGs), within their social, environmental, and economic dimensions. Wisely used, they can significantly contribute to Europe's policy priorities within the framework set by the European Green Deal and to policy processes which are already underway. Finally, by looking more closely at the untapped potentials of NWFP and the main challenges that inhibit that potential to be realised, it can be seen where new focus and a new approach would facilitate a major role for NWFP in the design and implementation of rural development strategies, providing income for rural people sustainably and fairly, transforming unsustainable food systems, and supporting European policy ambitions towards a greener economy restart.

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2.1 NWFP and the sustainable development goals

NWFP are a central element of sustainable development and sustainable forest management. These concepts have been highlighted in international agreements since the Rio Summit (1992), such as in the Second and Third European Ministerial Conferences on the Protection of Forests in Europe (in particular Helsinki, 1993, and Lisbon, 1998)[11]. Despite fragmented data and persistent knowledge gaps, there is increasing evidence on the significant potential of NWFP to contribute to the 17 SDGs, notably regarding their social and cultural, environmental and economic dimension.

SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

Figure 1. The UN Sustainable Development Goals
https://sdgs.un.org/goals

[11] https://foresteurope.org/wp-content/uploads/2016/11/Commitments_all.pdf

Social and cultural dimensions

SDG1 No Poverty, **SDG2** Zero Hunger, **SDG3** Good Health and Well-being, **SDG5** Gender Equality, **SDG10** Reduced Inequalities

The collection and production of NWFP are part of Europe's cultural heritage. Before they were farmers, Europeans were hunter-gatherers, depending on wild resources. Agriculture has never fully substituted forests as providers of diverse types of resources, and until about 200 years ago, forests were mainly used for multi-purpose objectives, and forest management was not timber-oriented. Recent research[12] shows that 90% of European households regularly consume NWFP, while 26% collect some type of NWFP, at least once a year, for self-consumption or sale. This makes up for more than 60 million European foragers, often organised in dynamic associations, such as those of mushroom pickers. These outdoor activities are the continuation of centuries-old traditional uses and knowledge, nurturing spiritual and cultural dimensions, as unique culinary traditions[13], and more active personal lifestyles.

NWFP contribute to health and well-being. Many NWFP are part of traditional food systems, nutritious, adapted to local conditions, and increasingly contribute to local, regional, and international food value chains (HLPE, 2017)[14]. The role of diversified diets based on local biodiversity and traditional and indigenous foods, which include NWFP, is well documented by case studies from around the world (FAO, 2009[15]; FAO, 2013b[16]). The trend for 'natural food' and 'superfoods' opens further opportunities to capitalise on traditional culture and food sources.

NWFP sustain European rural livelihoods. NWFP contribute to household food security and locally sourced products in many countries around the world, regardless of development status. The value of marketed NWFP in Europe has been estimated in €4 billion yr^{-1}, nearly 20% the value of marketed roundwood (Forest Europe, 2020)[17]. This could represent more than 10% of the income for 4.5 million households. The value of informally marketed and self-consumed products maybe, however, seven to ten times larger[18]. In addition, NWFP are an important driver of rural tourism in many areas.

NWFP contribute to social integration, gender balance, and equality. While the forestry and timber sector, which directly employs some 3.8 million people in Europe[19], is clearly male dominated, in the collection, transformation, and trade of many NWFP such as medicinal and aromatic plants (MAP), women play a more central role. Harvesting NWFP also provides rural jobs, and an important source of income for people that do not have many alternatives.

[12] https://doi.org/10.1016/j.forpol.2020.102175
[13] See for example: Borelli, T.; Hunter, D.; Powell, B.; Ulian, T.; Mattana, E.; Termote, C.; Pawera, L.; Beltrame, D.; Penafiel, D.; Tan, A.; Taylor, M.; Engels, J. Born to Eat Wild: An Integrated Conservation Approach to Secure Wild Food Plants for Food Security and Nutrition. Plants 2020, 9, 1299. https://doi.org/10.3390/plants9101299
[14] http://www.fao.org/3/i7395e/i7395e.pdf
[15] http://www.fao.org/3/i0370e/i0370e00.htm
[16] http://www.fao.org/3/i3144e/i3144e00.htm
[17] https://foresteurope.org/wp-content/uploads/2016/08/SoEF_2020.pdf
[18] Lovrić M, Riccardo Da Re R, Enrico Vidale E, Irina Prokofieva I, Jennifer Wong J, Davide Pettenella D, Pieter Johannes Verkerk PJ, Robert Mavsar R (2020) Non-wood forest products in Europe – A quantitative overview. Forest Policy and Economics 116, 102175, https://doi.org/10.1016/j.forpol.2020.102175
[19] 0.5 million people in forestry and 3.3 million people in wood industries. See https://ec.europa.eu/eurostat/statistics-explained/pdfscache/29576.pdf

Environmental dimension

SDG12 Responsible Consumption and Production, **SDG13** Climate Action, **SDG15** Life on Land

NWFP contribute to sustainable land management. Most NWFP are collected in forests not managed only for NWFP production; they provide complementary sources of income that are especially relevant in areas prone to wildfires and areas where timber value is low, as is often the case in the Mediterranean regions. Thus, they contribute to increasing the profitability of land uses, deterring rural abandonment, and providing opportunities to improve forest ecological conditions through active management.

NWFP diversify forests management in Europe[20]. Over 5 million hectares (Mha) of forests, and large extensions of other wooded land are primarily managed for the production of different NWFP or for coproduction with timber, pastures or other ecosystem services, including agroforestry systems. This includes 2.5 Mha of chestnut (*Castanea sativa*), 1.5 Mha cork oak *(Quercus suber)*, 1 Mha pines for pine nuts (*Pinus pinea*), and 0.2 Mha for resin (mainly *Pinus pinaster*). Management systems in these forests are generally extensive and multi-functional, with low environmental impacts, as harvesting levels are monitored and regulated. Expanding the area of forests managed for NWFP offers interesting opportunities for management and habitat diversification.

NWFP are instrumental in maintaining high biodiversity value agro-ecosystems and other priority habitats, as the 4Mha of open oak woodlands (the Portuguese montado and Spanish dehesa). Active co-management for cork, acorn mast, and often also for mushroom or other NWFP, contributes to the maintenance of habitat types of European interest, e.g. Habitat 9330 "*Quercus suber forests*", 9340 "*Quercus ilex and Quercus rotundifolia forests*", 6310 "*Dehesas with evergreen Quercus spp.*", where biodiversity conservation is strictly related to human management. There are other priority habitats such as 9540 "*Mediterranean pine forests with endemic Mesogean pines*", that have been preserved, in great measure, for the provision of resin or pine nuts.

[20] INCREDIBLE experts consider that nowadays no more than 2% of European forests and other wooded land (FOWL) are primarily managed for NWFP, although probably more than 80% of those FOWL actually provide resources other than wood. Hunting occurs on more than 75% of the area, mushroom and berries are collected on more than 33% of the area, and some 5% of FOWL area supports grazing. Before timber-oriented rational silviculture was developed some 250 years ago, these uses were widespread and acknowledged in virtually all Europe's FOWLs. Recognising the persistence of these uses would contribute to restore historical landscapes and values of forests.

Economic dimension

SDG8 Decent Work and Economic Growth, **SDG9** Industry, Innovation and Infrastructure, **SDG12** Responsible Consumption and Production

The current and potential **economic dimension** of NWFP often escapes statistics and foresights, as many NWFP are part of the informal economy or registered as agricultural products in official records. Nevertheless, the annual global income from NWFP was estimated by FAO at US$88 billion (€67 billion) in 2011[21], though this figure is a vast underestimation of the real value: in China alone, the estimated value of NWFP, including ingredients for traditional Chinese medicine and forest foods is about US$73 billion (€51 billion)[22]. Accounting for the value of self-consumption would increase the figure by an order of magnitude.

NWFP supply raw materials for bio-based industrial sectors. Cork is the second most relevant export sector in Portugal (€1.2 billion, i.e., 61% of world cork exports)[23]. European pine chemical industries have direct revenues of €2.5 billion (25% of global pine chemical's industry), and are based almost totally on imported resources[24]. Natural tannins are a key element of the Italian leather industry.

MAP are playing an increased role in the cosmetics, nutraceutical, and pharmaceutical markets. Valued at €79.8 billion (2019), the European cosmetics and personal care market is the largest in the world, offering enormous potential for development[25].

Europe is a key player in the NWFP trade. The EU accounts for almost half of the global NWFP imports (€4.2 billion) and 40% of exports (€3.4 billion), though of course domestic value chains from productions to consumption are not reflected in these international trade statistics[26]. Europe is the global leader in the supply of cork and cork-based products, sweet chestnuts, and Mediterranean pine nuts, and is a relevant player in the markets for truffles, vegetable tannins, and wild mushrooms. For most NWFP, however, Europe is a net importer. In 2014, for instance, Europe imported raw plant material with a value of €2.5 billion, 70% derived from wild collection of MAP from developing countries (UNODC, 2016)[27].

[21] FAO State of the World's Forests (2014) http://www.fao.org/3/i3710e/i3710e.pdf
[22] Sheppard et al., 2020. https://doi.org/10.1007/s40725-019-00107-1
[23] http://apcor.pt/wp-content/uploads/2019/02/CORK-SECTOR-IN-NUMBERS_EN.pdf and http://www.worldstopexports.com/top-cork-exporting-countries/
[24] https://www.pinechemicals.org/news/292194/GLOBAL-IMPACT-OF-THE-MODERN-PINE-CHEMICAL-INDUSTRY.htm
[25] https://cosmeticseurope.eu/cosmetics-industry/ and http://www.fao.org/documents/card/en/c/ca8590en/
[26] Amici et al., 2020. in: https://www.bod.de/buchshop/non-wood-forest-products-in-europe-9783752675290
[27] UNODC (United Nations Office on Drugs and Crime). World Wildlife Crime Report: Trafficking in protected species, New York: 2016. 98pp.

2.2 NWFP – a necessary element to achieve Europe's policy priorities

NWFP are at the heart of nature-based solutions that protect and restore biodiversity for the benefit of people and nature. They can make a significant contribution to many European policy ambitions, such as those related to sustainable land management, biodiversity conservation, circular bioeconomy, the green economy restart, healthy and resilient food systems, sustainable tourism, green jobs and public health, well-being and green recovery to address the impacts of the COVID-19 pandemic. In particular, NWFP can play a critical role in realising the following existing European initiatives and strategies.

1. The **European Green Deal** (2019)[28]. NWFP can help in the transition towards a carbon neutral, circular, and bio-based economy. Natural resins and cork, along with non-energy uses of tall oil[29], and engineered wood products can significantly replace non-renewable, high carbon footprint materials in numerous applications. Edible NWFP can contribute to a fair, healthy and environmentally-friendly food system, reducing the need to use chemical pesticides, fertilisers, and antibiotics. Territorial marketing and territorial development strategies can leverage the attraction of NWFP to support rural green jobs, especially in mountainous and other marginalised areas.

2. The **post 2020 Common Agricultural Policy (CAP)**[30] sets renewed ambitions for "*sustainability, safeguarding agriculture's position at the heart of Europe's society*", and supporting "*the economic future of farmers by fostering a smart, resilient and diversified agricultural sector that strengthens the socio-economic fabric of rural areas*". Agroforestry and NWFP value chains are excellent vehicles for farm income diversification, to sustain complex multi-service farming and to re-connect people with rural areas and natural ecosystems. EURAF (European Agroforestry Federation) estimates that agroforestry systems could be established or regenerated on 90 million ha of arable land and 24 million ha in the EU27 and proposes 12.8 million ha as priority areas. Across the Mediterranean region and in other wildfire prone areas, this would greatly contribute to mitigating wildfire risk[31].

3. The **New Industrial Strategy for Europe** (2020)[32]. NWFP can provide raw materials and high value molecules for different industrial sectors and notably, the green chemical industry. They can support the "*Mid Century Vision 2050*" of the European chemical industries[33], that identifies increased sustainability, reduced emissions, and circularity as some of its key challenges. Natural Origin ingredients can also play an increased role in the mission of the European cosmetics industries to support sustainable development[34], *"reducing environmental footprint, creating quality jobs, and enhancing the social value for communities where products are sourced, manufactured (including value chain), or purchased"*, increasing the reliance of the cosmetics industries on natural and organic ingredients. NWFP such as cork, natural resin, and tannins can also play a role in greening the construction, manufacturing, and fashion sectors.

4. The **EU Biodiversity Strategy for 2030**[35] sets ambitious targets for protecting nature and reversing the degradation of ecosystems and aims to: expand and effectively manage protected areas (up to cover 30% of land area); expand agro-ecological practices (to over 25% of the productive land area); reduce pesticide use by 50%; and restore land under organic management practices. NWFP have diversified and low intensity management, helping maintain biodiversity-rich agro-ecosystems and connecting people to natural areas in multiple ways. Thus, NWFP can significantly contribute to achieving those targets, as recognised by the *European Business for Biodiversity Platform*[36] and the *Business for Nature*[37] coalition.

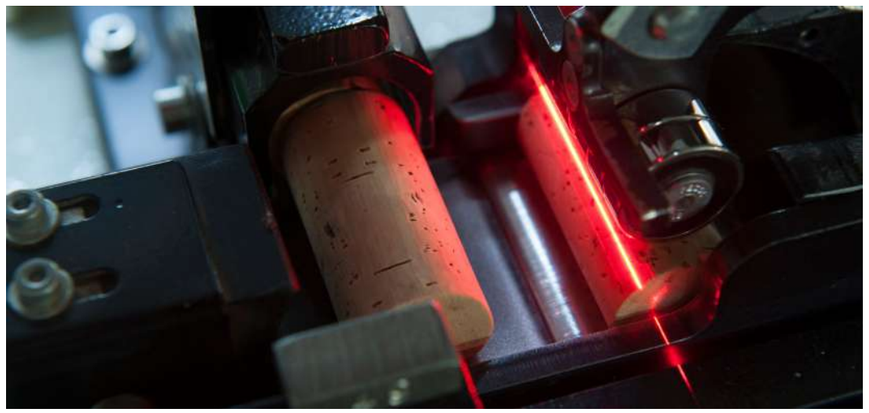

Photo by: Amorim Cork

28 https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
29 Tall oil is a by-product generated in the wood pulp production process.
30 https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en
31 EURAF Policy Briefing No 2, Sept 2020; https://www.researchgate.net/profile/Paul-Burgess-3/publication/Agroforestry-as-a-sustainable-land-use-option-to-reduce-wildfires-risk-in-European-Mediterranean-areas.pdf

32 https://ec.europa.eu/growth/industry/policy_en
33 European Chemical Industry Council (CEFIC) vision for 2050
34 Cosmetics Europe initiatives for sustainable development
35 https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/eu-biodiversity-strategy-2030_en
36 https://ec.europa.eu/environment/biodiversity/business/index_en.htm
37 https://www.businessfornature.org/

5. The **Pharmaceutical Strategy for Europe** (2020)[38] intends to provide affordable, accessible, and safe medicines for all, supporting competitiveness, innovation, and sustainability of the EU's pharmaceutical industry. It looks for diversified, secure supply chains and promotes environmentally sustainable pharmaceuticals, for which MAP are highly relevant. In fact, Europe's use and trade in MAP is extensive, with eight countries amongst the top twenty global importers by volume of MAP, and six of the top twenty exporters. The majority of internationally traded MAP are raw or semi-processed and of wild origin[39].

6. The **EU Farm to Fork Strategy** (2020)[40] aims at more healthy, affordable, and sustainable food for Europeans in 2030. Forests are a key component of food security at a global level, as *recognised by the FAO*[41] and the *Committee on World Food Security*[42], and can also play an important role in food production, and vibrant food and gastronomic value chains, embedded in cultural and natural heritage. Extensive agroforestry systems, truffle cultivation, mushroom gastronomy, exemplify this potential. Increased attention to NWFP can also generate new opportunities to decarbonise the food sector and create other environmental benefits and support viable agroforestry systems.

7. The **EU Forest Strategy**[43] aims at promoting sustainable forest management in support of biodiversity conservation and climate change mitigation and other ecosystem services, and the provision of sustainable growth and jobs to support rural development. Simply said, in the absence of NWFP value chains, it would hardly be possible to achieve those objectives in most European regions. Moreover, considering that Europe is the main importer of NWFP, sustainable and fair trade of NWFP can make a significant contribution to preserving and restoring forests outside Europe, in line with the intention to *Step-up EU action to Protect and Restore the World's Forests* (2019)[44] and the proposed EU Forest Partnerships.

8. Finally, the **EU Climate Action**[45] is at the heart of the European Green Deal. The 2050 climate-neutrality objective will not be reached unless: active multi-purpose forest management is pursued; climate-smart forestry is applied; non-sustainable products are replaced by sustainable products; the role of agroforestry is promoted; there is a closer integration of forestry and agricultural activities; and more resilient landscapes are created.

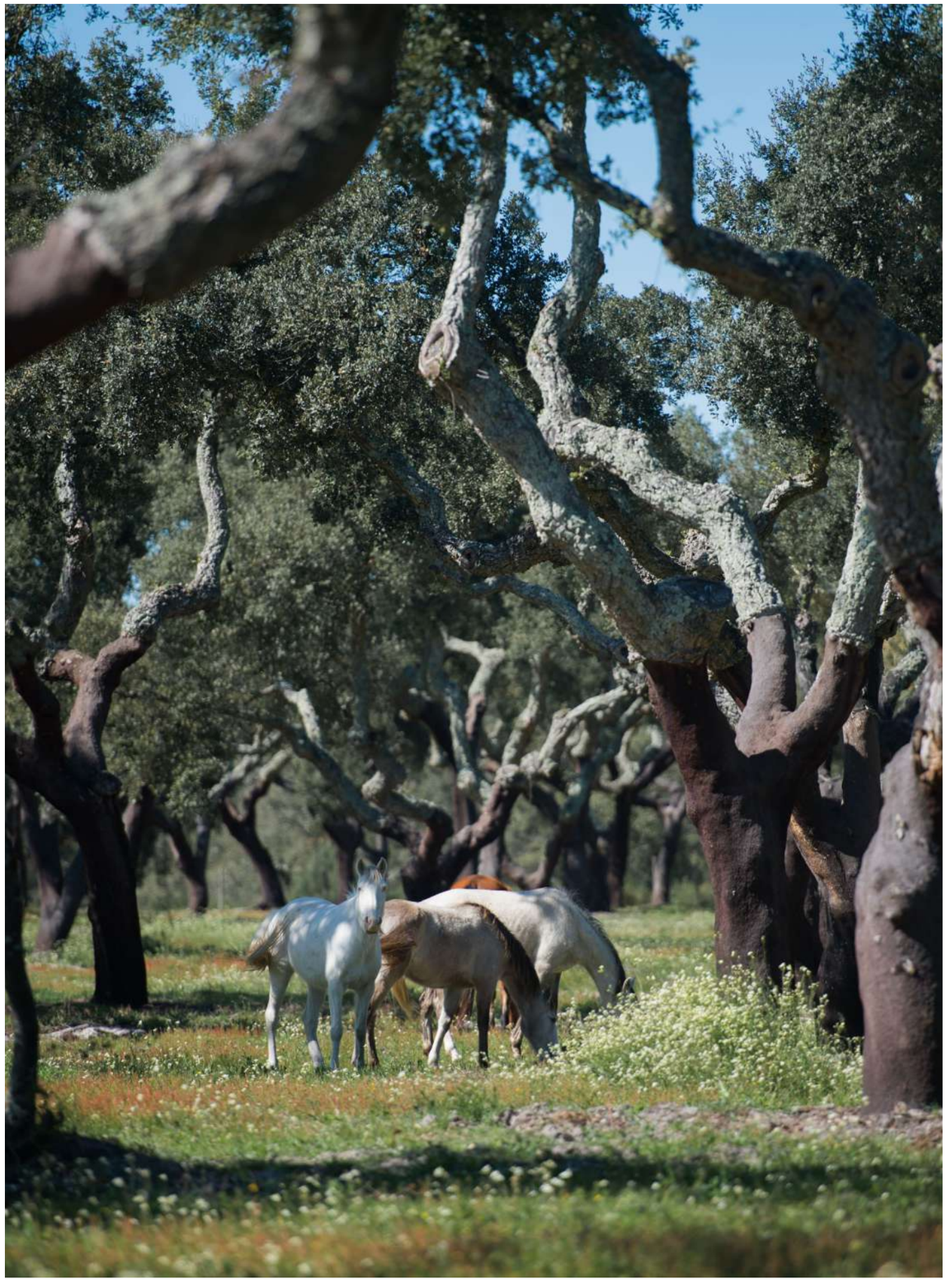

Photo by: © ouliyya / shutterstock

[38] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2173
[39] Allen, D., Bilz, M., Leaman, D.J., Miller, R.M., Timoshyna, A. and Window, J. 2014. European Red List of Medicinal Plants. Luxembourg: Publications Office of the European Union https://op.europa.eu/s/o0YC
[40] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[41] http://www.fao.org/forestry/food-security/en/
[42] http://www.fao.org/3/I8877EN/i8877en.pdf
[43] https://ec.europa.eu/info/food-farming-fisheries/forestry/forestry-explained_en#theeuforeststrategy
[44] https://ec.europa.eu/environment/forests/eu_comm_2019.htm
[45] https://ec.europa.eu/clima/policies/eu-climate-action_en

2.3 Untapped potentials and major challenges

Many known unknowns prevent strategic decision making

The values of NWFP production presented in the previous section are an underestimation of the total contribution of NWFP to sustainable development. There are very important knowledge gaps in relation to collected wild products and the functioning of informal 'grey' and illegal 'black' markets. There is also a lack of understanding on the value and jobs created in the transformation industries in diverse and divergent value chains. This is especially noticeable when it comes to understanding the value created through tourism and recreation services associated with the production and collection of NWFP Nor is it possible to estimate the presumably high impacts on public health and well-being, or the co-benefits produced when managing land for NWFP, in terms of wildfire risk mitigation culture, traditional knowledge, and other ecosystem services, although these are thought to be significantly larger than market values can show. As an example, in Sardinia (Italy) the value of ecosystem water regulation has been assessed as being three times the value of cork[46].

Certainly, increased supply and substitution of imports offer enormous potential to strengthen important industrial value chains, to activate and complement sustainable forest and land management, and to sustain rural development strategies. In fact, across the globe, there is growing interest in natural, wild and traditional foods, superfoods and nutraceuticals, particularly among high income, health- and ecologically-minded consumers. Perceived as 'green', 'traditional' and 'local', NWFP can play a major role in the design and implementation of rural development strategies as well as the transformation of unsustainable food systems[47].

A fragmented policy landscape jeopardises coherent action

NWFP include a wide variety of products that feed into a wide diverging range of value chains (food, feed, chemistry, pharmaceuticals, cosmetics, clothing, construction, etc.) and services (e.g. ecotourism, recreation, gastronomy, etc.); they are produced in many ways, from wild collection to different stages of domestication and cultivation; they encompass a wide range of land uses, from forests and agroforestry systems to other wooded land; and they present many different business models, with varied sizes and degrees of professionalisation and vertical or horizontal integration.

As a consequence, NWFP are often at the boundary of different policy domains and this has often left them in a 'no man's land' when it comes to policy regulation and strategic policy action. Institutions across Europe have addressed specific regulatory needs, drawing ad hoc lines to separate *wild* from *farmed*, *forest* from *agricultural* products, and *plant-based* from *animal-based* products, etc. In doing so, certain products are either included or excluded from a given policy or regulation. This has created significant gaps and grey areas in strategic policies such as the 'Farm to Fork' strategy, the CAP, and related rural development, as well as forestry measures. Moreover, products outside sectoral boundaries, will even fail to be represented in statistics and data gathering, posing further difficulties with respect to attracting visibility and political attention.

In short, the cross-sectoral reach, and the boundary nature of many NWFP, results in a high degree of policy fragmentation. Many different regulations — at EU, national, and sub-national levels — have a strong impact on their current situation and are responsible for some of the pitfalls that hamper the development of profitable NWFP value chains. Better coordination and strategic and coherent action across the different policy domains are, therefore, urgently needed.

[46] Corona et al, 2018. https://doi.org/10.3832/ifor2558-011
[47] https://www.researchgate.net/publication/338955410_New_Values_of_Non-Wood_Forest_Products

NWFP and the green economy restart: an increasing supply gap

Demand for many NWFP (e.g. cork, resin, tannins, aromatic plants) is high and expected to increase. This demand is driven by: the need to reduce dependence on non-renewable resources and to transit towards a sustainable circular bioeconomy; the renewed interest in natural ingredients for healthy diets and personal care; the surge in demand for traditional products with strong cultural heritage; and also by growing interest in experiential services in tourism or recreation, such as wild food gathering.

Over the last century, Europe's capacity to supply and sustain NWFP value chains profitably had been diminishing, with Europe becoming increasingly reliant on imported equivalents, or directly losing markets to fossil-based substitutes. Despite enormous global demand, cork production has halved, from more than 400 000 t yr^{-1} in 1963 to less than 180 000 t yr^{-1} in the last years. In fact, limited supply is the biggest current constraint for the European cork industry, while paradoxically, one third of traditionally managed cork forests have been abandoned. Similarly, for reasons of declining profitability pine resin production has declined from 300 000 t yr^{-1} of the 1960s to less than 10 000 t yr^{-1} in the early part of the 21st century. In recent years, a very tight global supply has allowed a recovery of European production to some 20 000 t yr^{-1}. Chestnut production has dropped from 1 million t yr^{-1} around 1900 to 0.15 million t in 2020, a reduction of 85%, mainly as a consequence widespread chestnut dieback caused by fungal diseases, while Europe imports about 17 000 t from non-EU countries[48]. Europe is also a net importer, of mushrooms and MAP. In this difficult context, climate change represents an additional challenge, that increases uncertainty of future supply.

In order to bridge the divide between shrinking NWFP supply and growing demands, it is important to identify existing barriers that are related to structural elements. These include, inter alia, secured access to the resource, high costs of extraction, reduced innovation capacity, scarcity of a skilled workforce, land-use competition, or a lack of equitability along the value chains — real or perceived — that demobilises primary producers. To overcome these barriers, concerted action by different stakeholders and strong public–private cooperation is needed. There is already some momentum to build upon. For example, more than 100 000 ha of cork oak have been planted in Spain since 1993 – they will enter production in the coming decades[49]. In Portugal, the area of *Pinus pinea* for pine nut production has grown fourfold from 50 000 to 195 000 ha (more than €40 million has been invested in this expansion)[50], and in Spain, over 15 000 ha of forest have recently been brought into truffle production[51].

[48] Tomé et al., 2020. In: https://www.bod.de/buchshop/non-wood-forest-products-in-europe-9783752675290
[49] Ovando et al., 2007. http://dx.doi.org/10.22004/ag.econ.167367
[50] https://www.unac.pt/index.php/documentos/publicacoes/45-cadeia-de-valor-da-fileira-da-pinha-pinhao
[51] https://citarea.cita-aragon.es/citarea/bitstream/10532/3567/1/2016_316.pdf

A need to secure sustainable harvesting and fair trade

In many areas of the world, notably in tropical and subtropical regions, NWFP can represent a significant income for rural people[52]. As the leading importer of NWFP, Europe has an important role for sustainable harvesting and trade in the countries of origin. Without guarantees of sustainable forest management and labour conditions in these countries, NWFP consumption in EU markets might have unknown detrimental effects on environmental quality and social equitability, promoting 'unsustainable harvesting' or 'imported deforestation' in supplier countries[53].

The responsibility does not only rest with governments. NWFP operators and sectoral organisations can and should do more to strengthen the sustainable supply, to increase transparency, and to address the risks of illegal or unsustainable harvesting, submerged economies, social conflicts, or even environmental crimes related to forest resources exploitation[54]. Compliance with labour standards, and improved traceability to guarantee food safety and resource sustainability are equally important.

Photo by: © Bentor / Adobe Stock

[52] Shackleton, Sheona, et al. "Non-wood forest products: description, use and management." The Dry Forests and Woodlands of Africa (2010): 93.
[53] Pettenella & Masiero, 2020. Deforestation Made in Italy. Le responsabilità delle imprese e dei consumatori italiani nella deforestazione dei paesi tropicali. Etifor. https://www.researchgate.net/publication/344668325
[54] UNEP (United Nations Environment Programme). The environmental crime crisis: threats to sustainable development from illegal exploitation and trade in wildlife and forest resources. New York: 2014. 106pp.

Photo by: © Pontus Edenberg / Adobe St

CONCERTED ACTIONS TO ACHIEVE CORE POLICY OBJECTIVES

3. Concerted actions to achieve core policy objectives

Better targeted and more coherent policies would help to realise the potential contribution of NWFP to sustainable development, the development of a circular bioeconomy, nature conservation and human well-being. Specifically, recommendations target four main objectives.

SUPPLY

1. Secure conservation and sustainable supply of NWFP, addressing the risk and negative impacts derived from climate and social change, including increased pressures on resources, unsustainable practices, and the erosion of cultural heritage.

VALUE

2. Support viable, competitive, and transparent value chains for the integration of rural and urban economies, ensuring sufficient and equitable returns for local communities, land and forest managers/owners, harvesters, and a fair distribution of profit along the value chain.

INFORM

3. Ensure transparency on material and economic flows, through improved data collection, and through adequate classification, labelling and communication over NWFP origins, qualities, and trade, increasing the visibility of NWFP in official statistics (e.g. economic, labour, recreational)

ENABLE

4. Provide enabling conditions to support all actions in a coherent policy environment and an active and capable governance framework.

Action is needed at different territorial scales, from the international and European to the national, regional, and local, respecting the subsidiarity principle. States are well-positioned to take the lead on relevant, key NWFP through, for example, national programmes, as later proposed. European action has enormous potential to improve coordination, harmonisation of regulations, integration and dissemination of information, mainly as part of bioeconomy and rural development policies. Action by the United Nations with respect to improving the collection and codification of trade statistics to promote sustainable and legal value chains and biodiversity conservation would further be beneficial in promoting the sustainable consumption and production of NWFP.

Photo by: © Leon Forado / Adobe Stock

3.1 Securing the conservation and sustainable supply of NWFP

Strong societal trends favouring bio-based, natural, wild, and unique products and experiences are increasing demand for NWFP. This opens opportunities but can also have negative consequences. Resource scarcity is emerging as one of the limiting factors. For NWFP mainly collected in the wild, increased demand may lead to unsuitable harvest levels, uncontrolled trade, biodiversity loss, and resource depletion. It could also generate conflicts between local communities and professional NWFP collectors.

For NWFP produced in managed forest ecosystems, lack of supply is related to abandonment of forest management or intensification of agriculture in agroforestry systems, both in response to reduced profitability of primary production in absence of compensation for common-good ecosystem services they provide. European forests as we know them are both social and ecological systems, influenced for hundreds of years by human uses and management. Maintaining complex forest landscapes that provide a rich portfolio of wood and non-wood products requires active management. The capacity of forest systems to provide multiple forest ecosystem services sustainably, primarily but not limited to the provisioning of diverse resources, is in the core of forest restoration and conservation, offering nature-based solutions for renewable feedstock sourcing without forced input of agrochemicals, fertilisers, etc. Abandonment of forest uses and resources in Europe can also lead to over-exploitation in countries with weaker forest governance. In all cases, these risks are exacerbated by the negative impacts of land-use change and climate change.

Urgent action is needed to protect and enhance the resource base, to promote sustainable forest management, including sustainable harvesting practices and improved monitoring systems.

Focus 2.

A three-headed Hydra threatening NWFP conservation and supply

Climate change is affecting the vitality, structure and function of forest and other woodland ecosystems, and thus, the availability of NWFP. Of special concern are the impacts of ongoing reduction of precipitation – drought cycles – and increased aridification across the Mediterranean basin that is reducing NWFP availability and quality while increasing seasonality, and jeopardising supply chains and territorial marketing strategies. Of special concern are the effects on wild mushroom production and climate-mediated nut masts (i.e. yearly natural massive variation in nut production). In addition, climate change and global trade are accelerating the spread of exotic and local pests and diseases. Some worrisome cases include the decay of resin-tapped maritime pine (*Pinus pinaster*) in Portugal caused by the fatal pine wood nematode (*Bursaphelenchus xylophilus*), reduced production of pine nuts and chestnuts across the Mediterranean due to the western conifer seed bug (*Leptoglossus occidentalis*) and the chestnut gall wasp (*Dryocosmus kuriphilus*), respectively; and the greatly reduced quantity and quality of cork due to the flatheaded borer (*Coraebus undatus*) or the gypsy moth (*Lymantria dispar*).

Uncontrolled or untrained harvesting of NWFP can lead to over-exploitation and to the use of **unsustainable and damaging practices** (e.g. the collection of immature specimens or damaging the vegetation while collecting). Frequently these threats are linked to the **illegal or informal trade**, but also to **a lack of a well-trained workforce** in otherwise legal operations. As an example, untrained or unprofessional cork-stripping or resin-tapping operations can lead to tree damage and ruin product quality and quantity for the remaining life of trees. Also, rural abandonment, loss of traditional knowledge, low profitability, seasonality, and the remote location of the workplace, put additional barriers to the professionalisation of NWFP collectors. For most wild-collected products, knowledge and training is needed for implementation of good practices. Counter-intuitive scientific findings can challenge commonly accepted wisdom. For example, recent studies have shown that fewer pines per hectare can yield the same amount of resin as denser stands, because each tree produces more as a result of less competition; this increases resilience to climate change and improves profitability (by reducing workload).

Land-use changes are reducing the extension and vitality of extensively managed and NWFP-rich forests and agroforestry landscapes, as is the case of dehesa and montado, open oak woodlands, critically relevant for cork supply and acorn mast. Rural abandonment translates into forest expansion, densification, and simplification, as in the case of mixed oak stands, where cork oak (*Quercus suber*) is progressively outcompeted by holm oak (*Quercus ilex*) and lost for production in Sardinia. This leads to an increased wildfire risk and reduced plant diversity. Likewise, the loss of complex and open forests and agroforestry systems also reduces the diversity, availability, and accessibility of NWFP (e.g. the range of different edible mushrooms). Moreover, rural abandonment generally encompasses the loss of traditional knowledge and of an available trained workforce, further hampering the production of NWFP, as is the case for cork and natural resin. Paradoxically, most wild products come, at least in Europe, from managed forestry and agroforestry systems.

3.1.1 Enhance the resource base

The forest area in Europe is increasing at a rapid rate with large areas of abandoned agricultural land becoming reforested. This process is especially intense in inland Mediterranean countries. Forest encroachment creates not only positive ecosystem services (e.g. carbon sequestration or soil restoration), but also ecosystem disservices (e.g. extreme fire events, less rainfall runoff and river discharge, or loss of open habitat species). The active, multi-functional management of these expanding forests is the first necessary step to guarantee healthy, sustainable ecosystems, and to achieve a balance of goods and services to address societal demands, and minimise the disservices. Specifically, increased emphasis is needed in sustainable multi-purpose forest management to ensure the complementarity of providing wood as well as NWFP and other ecosystem services:

- **Focus on active forest management of existing forests.** The afforestation efforts during the 20th century have played an important role in reversing deforestation of previous centuries, leading to the expansion of the forest area. Nowadays, however, efforts should focus on managing and diversifying those planted forests, and the large areas of spontaneously expanding young forests. This is necessary to overcome simplified ecosystems (single-cohort plantations), to increase their resilience and value.
- **Embrace multi-functional forest management to enhance NWFP production,** transitioning from timber-oriented forestry, towards an integrated, more flexible multi-functional forest management at the landscape scale. In some cases, existing forest management prescription will need to be revisited, to develop new silvicultural systems more appropriate for NWFP. For instance, adequate thinning can increase the yield of high-quality mushrooms, significantly increasing economic returns compared to timber-only approaches. Similarly, in some countries, regulation will need to make room for specific management units, like resin-tapping lease units, mushroom hunting grounds, or MAP collecting units, whose boundaries do not necessarily coincide with those of traditional management plans.
- **Recognise the strategic importance of agroforestry habitats,** that are especially rich in NWFP. The recognition of the strategic importance of agroforestry systems made in the EU Green Deal must be translated into targeted policy support, inter alia, the strategic plans of the Farm to Fork and Biodiversity Strategies, and the CAP and Rural Development Programmes.
- **Support long-term investments into forests through appropriate instruments** to overcome the long-term return on investments needed for the active management of spontaneous and planted forests or to address the lack of private profitability. Sound approaches are needed to upscale

green investments — frequently restricted to specific issues like afforestation, carbon forestry, or wildfire prevention — to embrace the multi-functional management of new, spontaneously regenerated or planted forests.

- **Explore the role of domestication, to secure the supply of the most demanded NWFP,** and to reduce the pressure on wild populations (Figure 2). Examples of recent domestication successes in NWFP are strawberry tree fruits (*Arbutus unedo*); Mediterranean pine nuts from *Pinus pinea*; mushrooms like *Agrocybe aegerita, Boletus edulis, Tuber melanosporum, T. magnatum*; or MAP like *Argania spinosa* for argan oil in the Maghreb. However, successful domestication can put wild collection at risk. Origin, quality and 'wild product' labels, differential commercialisation, and territorial marketing approaches, can help maintain a certain market share for sustainable traditional wild collection.

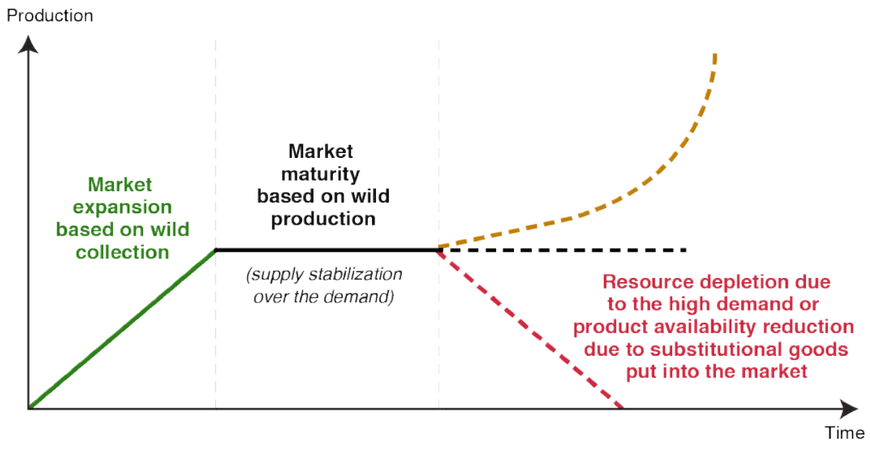
Production
Market expansion based on wild collection
Market maturity based on wild production
(supply stabilization over the demand)
Resource depletion due to the high demand or product availability reduction due to substitutional goods put into the market
Time

Figure 2. NWFP development paths.
Source: Pettenella[55] modified from Homma (1992). Many NWFP may be considered in the market expansion phase (green line) heading towards a maturity stage based on wild collection (black solid line). Resource depletion may result from either over-exploitation or reduced collection due to the substitution by cheaper alternatives (red dotted line). An increased production led by an increased demand may result from domestication or improved production processes (gold dotted line), provided that differentiated labelling systems protect and valorise wild forest products, justifying their inherently higher prices.

[55] https://www.efi.int/publications-bank/non-wood-forest-products-europe-seeing-forest-around-trees

3.1.2 Ensure sustainable harvest levels and fair and secure access to the resource

Developing competitive value chains based on NWFP (e.g. essential oils) or their services (e.g. mushroom tourism) also requires secure and predictable access to resources. Significant knowledge and training gaps remain not only in relation to sustainable harvest levels, intensities and techniques, but also in relation to the organisation and transparency of the value chains and the skills and motivation of harvesters of many wild-collected products. This is in sharp contrast with the wood supply chain, or that of some more industrial NWFP like cork or resin. Existing uncertainties only exacerbate the need to assess, regulate, and control annual or seasonal harvest levels, and the need for resource monitoring, as the basis for a sound knowledge-based and sustainable management. For this to be possible urgent action is needed to:

- **Guarantee fair, predictable and transparent access to forest resources.** Frequently, harvesting rights for NWFP from public forests (cork, resin, pine nuts, MAP) are auctioned — or not — as an administrative procedure on an annual basis. This, together with masting and weather-driven yield variations, creates uncertainties of supply and jeopardises investments in processing and commercialisation. To overcome this situation, it is important that the responsible authorities make efforts to improve transparency and predictability of resource availability, developing early assessment methods and publishing information on accessible resources, with stability and the periodicity that is appropriate for the market.

- **Regulate and respect harvest rights for NWFP.** In a similar way that specific civil laws regulate rights for fishing and hunting, access and collection rights should be clarified for mushrooms, truffles, aromatics, or wild berries; such rights frequently remain unclear. Once regulations become clearer, they need to be enforced. The basic requirement is that national and regional authorities have clarified the regime for each type of resource and land ownership, the legal requirements for harvesting (e.g. licences, permits, leases, technical prescriptions), as well as requirements and circumstances for placing the harvested material on the market, including, as appropriate, billing and/or taxation duties (see section 3.2.2). Access to resources might be completely free, or regulated but free of charge, or under fee, paid permit or, if exclusive, as lease by auction or other types of agreements (Box 1). Regulations of shared access should distinguish occasional pickers and hobbyists from professional harvesters, to protect the social relevance of NWFP. In fact, regulation of picking activities can help prevent or address existing or potential conflicts among local/

Box 1:
How contracts or picking permits can reward forest owners and control harvest pressure

Photo by: ©Orlando Bellini / Adobe Stock

In the Italian Apennines, near Bologna, a win–win agreement between landowners and a truffle picker association *'Associazione Il Tartufo Bologna'*, has emerged as a successful case study. Thanks to a lease agreement, the owner maintains his property rights and receives rents, while the truffle picker association manages the land and reserves the truffle harvesting rights for its members, who pay an annual fixed fee. As a consequence, a forest system that would have been abandoned is now actively managed. In Spain, the national Forest Law of 2003[56] clarified that mushrooms were also *'fruits of the land'* and thereby property of the landowner, if she or he wishes to declare it and protect it as such. This allows private and public owners to establish who can harvest, in what amounts, and under what circumstances (authorisation, communication). Building upon this framework regulation, the region of Castilla y León (Spain) established a system of mushroom picking permits in 2003, widely accepted on a voluntary basis, and finally officially recognised by Regulation 31/2017 of mycological resources[57]. More than 700 000 ha of forests have been grouped into mushroom management units[58] and around 100 000 picking permits are sold every year, at an average price of €6 per weekend. Another 5000 permits are commercially oriented and allow the pickers to sell their harvest to markets, and 25 local processing enterprises collectively manage the quality label *'Mushrooms of Castilla y León'*. Forest owners, mostly municipalities, dedicate the largest proportion of the revenues from permits (around €750 000 yr^{-1}) to maintenance, promotion and research, since the main objective of the system is to generate tourism rather than direct income from NWFP.

[56] https://www.boe.es/buscar/doc.php?id=BOE-A-2003-21339
[57] https://bocyl.jcyl.es/html/2017/10/09/html/BOCYL-D-09102017-1.do
[58] https://www.tramitacastillayleon.jcyl.es/web/jcyl/AdministracionElectronica/es/Plantilla100Detalle/1251181050732/Tramite/1284787076985/Tramite; https://servicios.jcyl.es/micoex/publico/consultaAcotados.action

non-local or hobbyists/professional pickers; such conflicts have been emerging in several places across Europe.

- **Establish adequate and realistic responsibilities and control procedures** to guarantee compliance with harvesting and commercialisation regulations. The fulfilment and control of these systems is not easy to achieve. At the harvesting end, this control can be built upon, as much as possible, individual responsibility (as in the tradition of everyman's right in Nordic and Baltic countries), on the involvement of local stakeholders, and collector associations (e.g. as in the shellfish collectors guild in Lourizán, Galicia, Spain)[59] but also empowering forest administration and guards. At the processing and consumer end, it should build upon due diligence systems, and voluntary certification schemes. It should be noted that regulation and control of wild harvesting is a necessary condition for professional harvesters to demonstrate compliance with organic and wild certification schemes.

- **Train workers and collectors adequately.** Correct execution of collection or harvesting operations is decisive for the protection of the resource and the quantity and quality of the NWFP produced. For this reason, NWFP management and harvesting should be incorporated in vocational education programmes; relevant training centres dedicated to NWFP have proved extremely valuable — e.g. CINCORK[60] is a training centre for the cork industry in Portugal; it was created in 1985 as the result of a private–public collaboration. The Spanish experience shows that it is not enough to define required skills and the corresponding professional certificates (e.g. UC-1291_1[61] for cork stripping and UC-1292_1 for collecting pine cones, wild fruits and mushrooms, plants, and for resin tapping), if those skills and certificates are not then offered in training centres, and incorporated into advisory services. The result is that NWFP workers only learn by practice and do not have formal training documentation of their skills; this poses barriers for mobility of a skilled workforce within Europe.

- **Build capacities on NWFP into renewed forest advisory services** as part of the Agriculture Knowledge and Information Systems (AKIS). Forest advisory services are often missing or severely under-developed, within European AKIS. When they exist, they often fail to incorporate advice or training capacities about NWFP. Stronger extension services are required to improve the replication of good practices and the uptake of research outcomes, such as, for example, those linked to mechanisation in cork (e.g. GoSuber)[62], new resin extraction procedures (e.g.

[59] https://www.cofradialourizan.es/
[60] https://www.cincork.com/articles/show/quem_somos.html
[61] http://incual.mecd.es/documents/20195/94271/AGA398_1+-+Q_Documento+publicado/b1a7e49e-226a-46d5-82f0-400503e00a1b
[62] http://gosuber.es/

ResiMec, SustForest, BoreHole)[63], mechanically aided harvesting of nuts (e.g. tree shakers for pine cones; chestnut collector machines in Portugal, France or Italy)[64], or MAP collection protocols (e.g. FairWild's Manual for Sustainable Wild Collection Practices)[65].

Photo by: Fotolia (*Pinus pinea* pine nuts)

3.1.3 Set up and improve monitoring systems and inventories

Most NWFP are produced in annual, perishable and often fluctuating amounts. Unlike wood, they can be non-conspicuous for part of the year. In many cases, there is a lack of knowledge on the factors influencing production and on reliable procedure to measure stocks, production potentials, and thus, sustainable harvest levels. Although traditional knowledge, local knowledge, and collectors' knowledge have provided the basis for millennia of sustainable use of NWFP, modern forest management requires data-based rules, especially when the commercial exploitation of natural resources is done by third parties under lease, licence, or permits. This is especially important in a context of climate change and emerging pests and diseases, as a complete lack of data in extreme cases does not allow the alarm to be raised in the event of emergencies, or to gather political support for action. Examples of such extreme cases include: the case of a severe attack by *Leptoglossus occidentalis*[66], a conifer seed bug that resulted in the collapse of Mediterranean pine cone production in 2011 in most producing countries including, Spain, Portugal, Turkey, and Italy[67]. In this respect, decisive action in the following areas is needed:

- **Embed NWFP resource assessment in National Forest Inventories.** National Forest Inventories and related modelling approaches have traditionally focused on forest growth and woody biomass yields and qualities based on stand and tree biometry. However, stocks and productivity of NWFP require new variables to be measured and new functions and models to be developed. A coordinated effort is needed on behalf of public institutions and research centres, national or regional ministries, or at the European level, to solve this lack of basic information, and to develop growth and yield models, among European countries and sectoral organisations (Box 2).

- **Support resource assessment of NWFP at European, national and sub-national scales.** NWFP monitoring, sampling or periodic inventories are essential at the forest management unit level to assess the stock and the actual annual harvest. This will allow fair prices to be achieved at auction, lease, or permit sales, and also allow control of adequate extraction rates, avoiding over-exploitation. This monitoring effort must include the assessment of harvesting levels and procedures, necessary to implement adaptative management approaches that put the regeneration capacity and resilience of the ecosystem at the core of management. Egg mass counts of Lepidopteran defoliators carried out annually in Sardinia, allow determination of whether cork debarking will be allowed in the following year and also definition of the intensity and location of phytosanitary treatments to preserve cork production[68]. This entails continuous public investment and constant training of institutions.

- **Establish innovative procedures to record information on collection and trade of NWFP.** This information is generally incomplete and scattered across different reports and data sets (e.g. Portuguese Information System on Pine Cones "SiP" on Resin "SiResin", or the Spanish Statistics on NWFP)[69]. In many countries, there is simply no official data about wild plant collection (e.g. in Sweden or Austria). To solve these gaps, innovative approaches are needed, such as those linked to new fiscal regimes (see section 3.2.2), traceability

[63] https://www.fafcyle.es/project/grupo-operativo-resimec/; https://www.sust-forest.eu/pt-pt/video/reportagem-do-canal-8-dedicada-resinagem-e-ao-projec-to-sustforest-plus; https://www.youtube.com/watch?v=ETW0v80gbcM
[64] https://www.youtube.com/watch?v=B7XaW1_wFlo; https://www.youtube.com/watch?v=Re7zigkAxcE; https://www.youtube.com/watch?v=eP4LrErpx4E
[65] https://static1.squarespace.com/static/5bec424b297114f64cb908d8/t/5cc9755b4785d307eac2e04d/1556706659380/IMO-Sustainable-Wild-Collection-Practices.pdf

[66] https://repository.incredibleforest.net/oppla-factsheet/20770
[67] https://doi.org/10.3832/ifor3180-013
[68] https://oppla.eu/casestudy/20351
[69] http://www2.icnf.pt/portal/florestas/fileiras/regime-juridico-pinha-pm; http://www2.icnf.pt/portal/florestas/fileiras/resinagem-circulacao-resina; https://www.mapa.gob.es/es/desarrollo-rural/estadisticas/forestal_anual_otros_aprovechamientos.aspx

Box 2:
Successful national or regional inventories and monitoring systems for NWFP

Photo by: © Patrick GHOMRI / Adobe Stock

Turkey has made a great effort to improve the national forest monitoring systems[70]. The regulation (Teblig-297) was passed in 2013, including the conditions on production and trade of NWFP. In 2015, more than 2800 species, with close to 14 000 records in 1.3 million ha had been monitored. A list of species (animals, plants and mushrooms) providing NWFP in the country is being maintained. In Greece, in order to establish specific regulations for the collection, certification, and trade of wild edible mushrooms, an expert working group produced a report in 2020, suggesting national lists of mushrooms of commercial interest, amateur interest, and protected species, training for collectors and inspection, licensing, traceability, and labelling procedures[71]. Proposals were discussed with various stakeholder groups and pilot implementation is underway. COST Action FP1203 and INCREDIBLE project actions in Greece offered a significant input throughout and after this procedure. In Spain, the National Forest Inventory has recently included the measurement of new tree parameters for maritime pine, which aim at predicting resin production based also on meteorological data. In Castilla y León (Spain), the regional forest service keeps a record since the 1960s of pine cone production in public forests managed for pine nuts, and maintains two highly valuable networks of permanent sample plots: one for individual tree pine cone production, and another one mushroom production in pine forests with close to 30 years of data.

[70] https://ormuh.org.tr/uploads/docs/D1-NWFPs%20Assessment%20Report%202020%20Cleared%20by%20FAO-17%20September%202020%20(1).pdf
[71] https://repository.incredibleforest.net/oppla-factsheet/19988

(see section 3.3.2), or inserting NWFP collection into the Farm Accountancy Data Network (FADN), that could provide information at the farm and regional levels.

- **Invest in research and development of NWFP assessment and monitoring.** The growth and production rates of most NWFP are less known, and inventory systems and techniques are missing or not sufficiently reliable or cost-effective. Mushrooms and truffles, for example, are organisms not visible above ground for all or part of the year, and whose mycelia are costly to detect. Production of nuts and berries are greatly affected by climatic and understory light conditions, or subject to masting years; these factors present challenges for modelling approaches. Even when assessment and modelling tools do exist, as in the case of resin, cork, or Mediterranean pine nuts, changing environmental conditions and the emergence of new pests and diseases require additional efforts to measure and estimate yields and associated qualities.

Photo by: © Mantonature / Istock

Photo by: © Steidi / Adobe Stock

3.2 Building competitive and equitable value chains

The number of downstream value chains derived from NWFP resources is potentially huge, spanning from food chains and gastronomy, to the pharmaceutical, cosmetics, chemical, construction, and recreation and tourism sectors.

The number of stakeholders directly or indirectly involved in the NWFP value chains is even greater, as they include self-consumers and non-professional collectors. The low bargaining power of producers and collectors, the existence of non-renewable substitutes and imported quasi-equivalents, along with a processors' landscape dominated by low-innovation small- and medium-sized enterprises (SMEs) creates high competitiveness in the markets and low profitability for producers and collectors at the first steps of the chains, and therefore a high risk of abandonment of the activity, especially noticeable in higher income countries. It is necessary to revert this situation, to recognise the positive social and ecological externalities of NWFP value chains, and to reduce competition from non-renewable or, sometimes, domesticated counterparts. Evidently, there is no 'one size fits all' solution, and this requires holistic and well-tailored strategies. However, some necessary conditions are the regularisation and professionalisation of labour, a well-tailored tax regime, as well as business models with capacity to generate and share income at all steps of the different value chains. To achieve this, several complementary strategies can be followed.

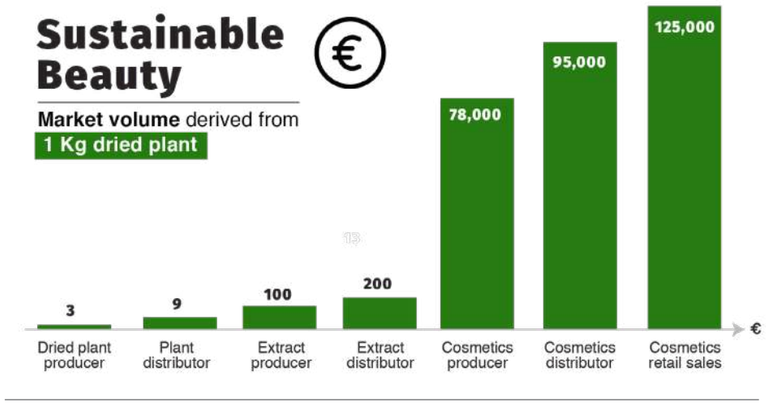

Figure 3. Market derived from one kilogram of aromatic plant collected or produced.
Source: R. Armengol (Provital Group)[72]

[72] *Sustainable Beauty. The impact in the supply chain.* Session presentation at the EFI's Young Leadership Programme 2018 – Mediterranean edition. https://efi.int/sites/default/files/files/events/2018/YLP-med%20presentations/Ricard%20Armengol.pdf

Focus 3.
Diverging value chains of NWFP

'Semi-wild', 'managed for', and 'cultivated' NWFP value chains, such as chestnuts, cork, resin, pine nuts, or truffles, are characterised by an *hourglass shape*, with multiple producers, selling NWFP to a reduced number of, generally sophisticated, processors (sometimes through intermediaries) that feed into multiple secondary and tertiary processors producing a wide array of products for different markets. They generally face tight competition from non-renewable substitutes (e.g. oil-based derivates for resin, aluminium or plastic stoppers for cork) or from imported quasi-equivalents (e.g. cheaper pine nuts, truffles, mushrooms of untraced foreign origin), resulting from lack of market differentiation and consumer awareness. Mainly due to reduced profitability for producers, several value chains have been abandoned, or greatly reduced, especially in higher income regions (e.g. cork and resin in France and Spain). This threat is greatly increased when lack of investment reduces the competitiveness of processing industries (e.g. cork in Sardinia, Italy).

'Wild' NWFP value chains, such as those of berries, mushrooms, truffles, and MAP, are often based around hobby collectors and a reduced number of professional, low-wage pickers or harvesters, that sell their products to a diverse array of intermediaries, retailers, processing companies, or final users (like restaurants). Generally, processors are micro-, small-, and medium-sized enterprises (MSMEs), with low innovation capacity, but able to leverage informal networks and trading channels. Frequently, products collected in the wild, face fierce — and unfair — competition with farmed production, unless appropriate labelling or marketing tools allow for discrimination from cultivated products. In these types of products, the added value increases exponentially downstream from the value chain, and thus, the value created for collectors, landowners, and communities is very limited, even when they incorporate primary processing or extraction of active substances (Figure 3).

3.2.1 Develop innovative and territorial value chains

NWFP should be inserted into the economic mainstream and to leverage their potential for territorial development. Action is required to generate revenues for landowners, to secure not only access to the land for hobbyist and non-professional pickers, but also a fair income and working conditions for professional pickers, as well as jobs and livelihoods for the local communities at large.

- **Favour co-management of public forests.**
  Co-management of public forests with local populations, grants access to land, and improves smallholder livelihoods. This could be achieved by means of incentives that encourage local populations to organise into cooperatives and production groups, as they have a greater capacity to reach markets, participate in tenders and improve the quality of management and products. Cooperative action by local stakeholders, under clear regulations and benefit sharing, has proved successful in many cases in delivering forest conservation, entrepreneurial growth and territorial development (Box 3).

- **Support territorial value chains and local networks.**
  Shortening NWFP value chains favours a closer connection between consumers, local producers and industrial entrepreneurs and dealers, often allowing for improved margins. The dimension of the local offer and demand, available local capacities and existing good practices are the conditioning success factors. Regional and national authorities should support existing initiatives or seek new opportunities for local value chain development (Box 6).

- **Realise synergies with tourism in territorial development strategies.**
  Tourism and especially ecotourism strategies can greatly benefit from increased interest in wild and traditional products, as well as in experiential activities in rural areas.

Photo by: © Sarah Adams

This opens up opportunities to generate synergies among a territory's services and products, making a tourism destination more attractive, and expanding the markets for NWFP-based products, experiences and other services, frequently supported by a well-recognised brand, such as '*Traditions and Flavours of Modena*'[73], or the '*Strada della mela e dei sapori delle valli di Non e di Sole*'[74]. Inspiration can be drawn from an increasing number of successful examples and tools for *mycotourism* that can be found all over the Mediterranean (Box 4).

- **Promote new business models and downstream integration.** As happens with most value chains contributing to the circular bioeconomy, the biggest share of added value is produced downstream, in secondary transformation and final products, limiting the attractiveness and even the economic sustainability of primary producers (cork, resin, pine nuts) or collectors (mushrooms, MAP). Public – private collaboration is necessary to promote entrepreneurship, and support new industrial and commercial endeavours. Examples of successful vertical integration include local distilleries in the southern Mediterranean that export essential oils rather than raw plant materials. Also, in Tunisia novel extracts been produced from *Pinus* spp., *Urtica dioica, Eucalyptus* spp., or *Melia azedarach* (this extract has insecticidal effects), and new gourmet or cosmetic oils from, for example, *Pistacia lentiscus* or *Pinus halepensis* seeds in Tunisia. New opportunities lie in natural well-being, spa, and para-pharmaceutical products, or do-it-yourself cosmetic kits, leveraging LOHAS (Lifestyles of Health and Sustainability), and halal tourism megatrends. Pine resin distilleries in southwest Europe have also started to produce a wide variety of products for specialised markets, including chemicals (adhesives, printing ink, paints, and coatings), pharmaceuticals, health care, cosmetics, food industry, flavourings and fragrances, or agrochemicals.

- **Support certification for quality, origin and sustainability** They can be based on local varieties, geographic origin identification, etc., as they can help in market differentiation and have the potential for improved margins (Trasmontana, Portugal; Corsica, France)[75], and can greatly increase the impact of territorial marketing strategies. Developing these certification schemes, in any case, requires an in-depth analysis of costs and benefits and market potential, the necessary knowledge to define and adhere to quality standards, as well as strong long-term commitment from private and public stakeholders, as transaction and certification costs can easily become cumbersome (FAO, 2019 and FAO/oriGIN, 2020[76]).

[73] https://repository.incredibleforest.net/oppla-factsheet/19802
[74] https://incredibleforest.net/sites/default/files/resource/files/6-presentazione_stradadellamela.pdf
[75] https://repository.incredibleforest.net/oppla-factsheet/20768; https://repository.incredibleforest.net/oppla-factsheet/20753
[76] http://www.fao.org/publications/card/en/c/CA5693EN/; https://www.origin-gi.com/images/events/oriGIn-FAO_Series_of_webinars_2020/03-final-Webinar_Sustainable_management_of_wild_collected_products_for_GIs_250221.pdf

Box 3:
Harvest rights in Tunisia: the case of medicinal and aromatic plants

In Maghreb countries, production of various NWFP mostly comes from lands owned by the state. In Tunisia, in particular, all forest areas are public and in order to use NWFP – such as Aleppo pine (*Pinus halepensis*) cones, stone pine (*Pinus pinea*) cones, MAP, or cork – producers and firms must go through a tendering procedure according to Article 18 of the Tunisian Forestry Code, organised each year by the Tunisian Forestry Authority. Usually, it is only larger private firms that have the sufficient price-negotiation and financial capacities to participate in the public tender. However, the local population represents the principal workforce hired to collect the plants and they may also collect plants for local use in small territories, as part of family projects and start-ups. Each year around 120 000 ha of land are exploited for MAP collection in Tunisia, though they remain underexploited: for the period 2000–2015, only 63% and 34% of the potential of rosemary (*Rosmarinus officinalis*) and myrtle (*Myrtus* spp.) were exploited, respectively. Moreover, to favour SMEs that specialise in essential oils or resin production, the government is seeking general reforms for investments and to support SMEs by devising specific programmes that facilitate financial loans or small credit access.

Photo: Aromatic Plans

The inherent risk of these forms of support is to benefit larger enterprises while SMEs struggle to take part due to the lack of the necessary management skills and warranties.

Box 4:
The role of wild mushrooms and truffles in the tourism sector

Photo by: © Sofia Royo / Adobe Stock

Examples for the mushroom passion and mycotourism in Italy[77] are 'Save the Truffle', an authentic truffle hunting experience, 'Fungo di Borgotaro IGP', a mushroom label of a small town that attracts thousands of tourists and foodies, and the 'International Alba White Truffle Fair', a truffle fair at its 90th edition. In Greece[78], Grevena in Western Macedonia has created a new identity as the 'Town of mushrooms', with museums and restaurants dedicated to wild mushrooms and festivals, surveys, and training activities by local associations. The Spanish region of Castilla y León is another example of successful mycotourism, which now accounts for nearly 40% of the total returns from mycological resources (estimated at €65 million yr^{-1}). In Portugal[79], some municipalities have defined mycological walking paths linked to mycotourism activities. The European Mycological Institute is promoting the international event Trufforum[80]. The European project MYAS has developed an app, Micodata GIS-Europe, which provides information on mycological yield, resources, and services, mycology-related cultural events, and information on areas where harvesting requires permits. This is just one of many examples of technological developments and digitalisation of NWFP-related services.

77 https://repository.incredibleforest.net/oppla-factsheet/19800; https://repository.incredibleforest.net/oppla-factsheet/19799; https://www.fieradeltartufo.org/en/
78 https://repository.incredibleforest.net/oppla-factsheet/20591
79 http://www.ecoparkazibo.com/uploads/2017/percursos/Percurso_Rota%20dos%20Cogumelos.pdf
80 https://trufforum.com/

- **Incorporate systems of Payments for Environmental Services (PES).** PES can be another income supply, when the value of NWFP producing systems is associated with their high natural value, rural setting, extensive or semi-extensive management models, stemming from traditional or historical practices with associated cultural values[81]. Positive non-market externalities should be integrated into the economic balance of the forest owner through a process of acknowledgement, quantification, and rewarding from accredited certification systems, public institutions, market operators, industrial companies seeking green investments, the general public, and tourists. Assigning a value to these services is a first necessary step. To bridge the market failure that is jeopardising these systems, NGOs, producer associations and industries may come together to promote and create incentives for sustainable NWFP production in protected and high value areas, under strict stewardship. Regulations have been developed, for instance, in Portugal[82] or Italy[83], but implementation is still lagging behind. The most successful, but niche, examples in Europe, have been linked to sustainable management certification schemes (Box 5).

Photo by: © Martina / Adobe Stock

81 https://repository.incredibleforest.net/oppla-factsheet/20792
82 https://dre.pt/home/-/dre/124353922/details/maximized
83 Art. 70 of https://www.minambiente.it/sites/default/files/archivio/allegati/GPP/legge_28_12_2015_221.pdf

Box 5:
Green Heart of Cork

Photo by: © INCREDIBLE project

A portfolio of ecosystem services provided by the cork oak forests in Portugal linked with good practices, audited within the certification scheme of the Forest Stewardship Council (FSC), allowed for the development of a voluntary market of PES where the enterprises choose the kind of services provided which they want to reward the landowner for. A connection with environmental NGOs and landowner associations that address the enterprises with the portfolio are important factors for success in market development. Promoting the creation of those associations and providing them with the means to operate is relevant to achieve the implementation of good practices, knowledge transfer, and certified areas, products and services.

Box 6:
Tools to help the connection between producers and industry consuming MAP

In Catalonia (Spain), most of the MAP producers follow a short chain model, where the company cultivates, collects and directly transforms the agricultural product into final products for the final consumer, benefiting the large Barcelona urban area. There is also an important industrial cluster consuming MAP raw material, but sometimes users do not know who the producer is. *The Directory of Medicinal and Aromatic Plant Producers*[84] is a tool to let industries meet producers and find out which species they are producing and under which production systems (Moré, 2020). This directory is maintained by the *Forest Observatory of Catalonia*[85] and provides information on different NWFP value chains.

Photo by: © pixabay

[84] http://directori-pam.ctfc.cat/
[85] http://www.observatoriforestal.cat/

3.2.2 Design and adopt innovative fiscal and labour regimes

Grey markets pose a serious problem for companies, especially those dealing in international markets, as they cannot determine the origin of their NWFP raw material. The problem arises from the way they purchase the raw material, since their informal suppliers are often reluctant to sign any formal invoice, making traceability impossible. Their attitude is due to the potential, real or perceived, incompatibility of occasional, non-professional or semi-professional picking activities with receiving social subsidies (e.g. retirement pensions, unemployment payments), or other employment contracts (e.g. permanent public or private employees, police labour force contract, etc.). Nevertheless, without these suppliers, many wild or semi-wild products would not enter the market, as picking or harvesting activities are rooted in the local culture of forest use, handed down from one household generation to the next. Grey markets also pose serious problems with regard to product quality guarantees, in the case of food NWFP, and ensuring adequate working conditions and professional capacity of the workforce.

Fiscal, and labour regimes are generally not well adapted to NWFP primary production activities and in particular to the seasonal and complementary nature of NWFP harvesting incomes. This lack of fit of labour policies and tax regulation should be addressed, as this is a necessary condition to move away from frequently grey economy practices, towards the formalisation of the workforce, legal collection, increased mobilisation of NWFP resources and higher public and private investments in land management. Some critical aspects to be addressed are:

- **Define clear boundaries on who the producers are.** It is necessary to clarify who is actually considered a ‘producer’, by defining the conditions that apply in terms of labour and tax regimes. In fact, clarity on labour and fiscal regimes that producers (pickers of wild products, farmers, or a combination of the two typologies) must comply with favours their entrance into the formal, legal market. If reasonable in terms of tax burden and bureaucratic requirements, this sets the basis for traceability, consumer safety, improved professionalisation, and transparency in NWFP value chains.

- **Adopt innovative fiscal regimes.** In order to address the seasonal and complementary nature of the incomes derived from NWFP production and commercialisation, countries have adopted different strategies to encourage the use of NWFP and to support the transparency of economic transactions, based on their regional conditions and cultural heritage. This contributes to the development of a formal economy.

Box 7:
Official registers for NWFP collectors need innovative approaches

Photo by: © pikselstock / Adobe Stock

Between 10 and 25 million Europeans (some 2–5% of the population) are estimated to collect mushrooms every year, mostly for self-consumption. However, some of them actually sell part or all of their harvest, with no clear indications of whether they are allowed to do so or not, which may raise concerns regarding the traceability and safety implications for restaurants and retailers. Experience shows that compliance with registries is very low. In Italy, registers of commercial NWFP collectors have been established by the chambers of commerce; however, uncertain or unfavourable tax duties have deterred actual registration. In Portugal, compliance with mandatory registration for pine nut and resin harvesters, established in 2015, has also been low for similar reasons along with insufficient control and lack of sanctions. In Castilla y León (Spain), only some 20% of the 1500 NWFP producers/collectors of resin, mushrooms, and pine nuts are registered in the security system under the corresponding activity code. Therefore, innovative approaches and more decisive action is needed, to allow these activities to enter the official labour system; anybody can be a passionate NWFP collector, and flexible systems are needed to record all those participating in such activities, regardless of their main professional activity.

A. A general tax exemption regime may stimulate active placement into the NWFP market, increasing supply and boosting a sector with positive impacts in marginal or remote rural areas. This is the option selected in Finland, where income received from selling NWFP is not subject to income tax if it is generated as an occasional activity and the total volume of selling remains below €10 000 per year[85]. This policy together with the *everyman's right* [87] regime applied to the majority of wild forest products (all the ones that do not grow physically on a living tree — e.g. wild mushrooms, berries, etc.) has allowed the development of a stable and formal supply chain, able to compete in international markets despite the higher prices. This option requires a high level of cultural respect and understanding of nature's carrying capacity and is very common in Nordic countries.

B. An option for setting-up mandatory registration and tax exemption thresholds to differentiate, in fiscal terms, professional economically oriented producers/ collectors from non-professional and occasional/amateur collectors. This formula has been adopted successfully in Italy, with national Law n. 145/2018[88] that established a threshold for income tax exemption of €7000 per year for occasional mushroom and truffle collectors (Box 8). Though there is no official data yet, sectoral observations report a dramatic increase of the formal transactions between occasional pickers and wholesaling companies since enactment of the law; also, the number of licenses has significantly increased, as well the number of professional pickers. A straightforward registration process, and the use of ICT tools also facilitated this success. This option seems promising for many NWFP and could be adopted by many countries or regions, provided that adequate monitoring and control on collection levels are designed and enforced.

C. Inclusion of NWFP under the general flat-rate agriculture fiscal regime. This would require, the explicit inclusion of wild gathering in Annex VII of the EU Value Added Tax Directive 112/2006[89], making wild harvested products eligible for the EU's flat-rate tax scheme for agricultural activities, extending to other products the recognition already granted to some NWFP subject to seasonal climatic risks. The core advantage of a flat-rate Value Added Tax (VAT) is to guarantee to NWFP producers and collectors, who are subject to the same constraints of other agricultural producers, such as seasonality, the same favourable conditions devised to support the primary sector.

D. A new European fiscal regime for wild forest product gathering. This entails the design of a new special regime applied to the NACE[90] category 02.30.00 "gathering of wild growing non-wood products" based on detaxation and de-contribution for social security. This option, would involve the creation of a special section of the EU Value Added Tax Directive 112/2006, referring directly to this NACE category and would allow each member state to design a VAT exemption threshold and to

[86] art. 89 of https://www.finlex.fi/fi/laki/ajantasa/1992/19921535#O3L4P89
[87] Right to roam and forage, https://ym.fi/en/nature-conservation-legislation
[88] https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2018-12-30;145
[89] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32006L0112
[90] Statistical Classification of Economic Activities in the European Community, https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_CLS_DLD&StrNom=NACE_REV2&StrLanguageCode=EN&StrLayoutCode=HIERARCHIC

Box 8:
An innovative taxation regime adopted for mushrooms and truffles in Italy

Most Italian truffle pickers are concentrated in a few regions such as Emilia Romagna, Abruzzo, Umbria, Marche, Toscana, and Piemonte. An interesting statistic showed that from the 1980s until 2014, the average age of truffle pickers dropped from 80 years old to 45 to 50 years old, which might suggest that picking mushroom/truffles is increasingly becoming a complementary activity for obtaining additional household incomes[91]. The taxation regime was an obstacle for the Italian truffle sector from 2005 until 2019, because the high level of VAT and income taxes were two factors that placed the Italian truffle supply chain at a disadvantage with respect to foreign suppliers. After a long evaluation process started in 2016, the Italian Government adopted the National Law n. 145, of 30 Dec 2018[92], on direct and indirect taxation for occasional pickers collecting wild forest products such as wild truffles. The Value Added Tax (VAT) exemption up to € 7 000 annual selling, for both a) farmers and b) pickers, and the flat income tax of € 100/year made truffle collection both convenient and formal at the same time. VAT exemption thresholds and reduced taxation on profits, accompanied by a reduced bureaucratic/legal burden, made it convenient for most pickers to enter the formal legal market. The exemption thresholds in this law are shown in Figure 4.

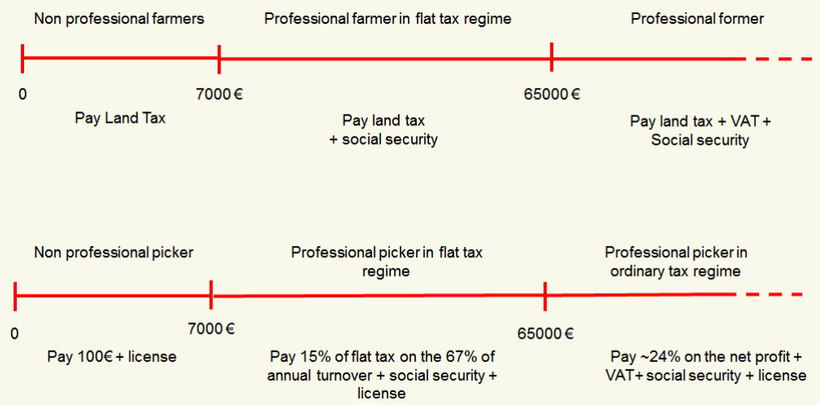
Non professional farmers
Professional farmer in flat tax regime
Professional former
0
7000 €
65000 €
Pay Land Tax
Pay land tax + social security
Pay land tax + VAT + Social security
Non professional picker
Professional picker in flat tax regime
Professional picker in ordinary tax regime
0
7000 €
65000 €
Pay 100€ + license
Pay 15% of flat tax on the 67% of annual turnover + social security + license
Pay ~24% on the net profit + VAT+ social security + license

Figure 4. **Innovative taxation reform in Italy under Law n. 145 of 30 December 2018.**

[91] https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11100
[92] https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2018-12-30;145

design at the same time an income tax scheme that fits with the existing procedures at the national level. The latter two approaches would also allow for increased fiscal harmonisation among EU countries, and contribute to a fair competition and dynamic markets across Europe. For instance, cork producers in Portugal are currently recognised as agricultural operators and pay a VAT of 6%, while in Italy raw cork is considered an industrial product, charged with a 22% VAT regime. This calls for a common and more consistent fiscal coordination across the EU.

- **Adopt adequate labour policies to tackle seasonality and undeclared work.** Labour policies must work hand in hand with tax regimes to address the transition from the informal to formal economy, eliminating undeclared work, in line with the International Labour Organization's Recommendation 204[93], and the EU Employment Package[94]. In the case of NWFP, it is especially important to develop an adequate policy mix to overcome the limitations imposed by the strong seasonality of highly intensive labour activities, as this hampers the provision of secure and well-paid jobs, and the development of a stable, well prepared and declared workforce. This situation is especially acute in rural and depopulated areas, where labour policies should provide alternative activities and/or targeted subsidies to secure income during low workload months, contributing to social integration of low-income households. A success story is the case of Soria in Spain for resin tappers, which has been followed by other provincial governments (Box 9).

- **Contractualise the relationships between landowners and collectors of NWFP.** The development of picking permit systems has proven successful in many countries and for different NWFP, helping control harvesting intensity and creating some revenue for the landowners. While it works very well for hobbyist pickers, regulating professional harvest and collection often requires a more comprehensive and robust approach. Contractualisation of collection and harvesting, if properly approached, facilitates horizonal collaboration (e.g. in cooperatives) and vertical development of value chains, and improves working conditions for forest workers and professional pickers that may be registered as autonomous workers or be part of the undeclared workforce. It also facilities traceability and guarantees a fair income for the landowner, whether private or public. In Spain, for instance, Law 2/2000[95], of agri-food contracts, defines a template for contracts between landowners and collectors — initially for resin and wild mushrooms — agreed by sectoral organisations, and supervised by the Ministry of Agriculture. Responsible authorities can build upon existing contractualisation experiences such as those developed for cork in Sicily, MAP collection in Doñana National Park (Spain)[96] or Arnica montana collection in the Haute Vosgues[97] regional park (France)[98].

[93] https://www.ilo.org/global/topics/employment-promotion/informal-economy/lang--en/index.htm
[94] https://ec.europa.eu/social/main.jsp?catId=1039&langId=en
[95] https://www.boe.es/buscar/act.php?id=BOE-A-2000-413
[96] https://repository.incredibleforest.net/oppla-factsheet/20472
[97] https://repository.incredibleforest.net/oppla-factsheet/20112
[98] cf. Incredible knowledge repository & European Commission EIP-Agri database

Box 9:
Adequate fiscal and labour regimes for resin in Spain favours a sectoral renaissance

Photo by: © CESEFOR

Plummeting Chinese resin exports in 2009 led to a renaissance[99] of the pine resin sector in Spain that has resulted in the incorporation of 1000 pine resin workers in five years since 2011 and the opening of three new industrial plants, with a capacity of more than 40 000 t yr^{-1}. A key initiative was the approval of a new labour and fiscal regime through the Treasury Order HAP/2222/2014[100], proposed by *the Regional Round Table of Resin*[101] based on a cost–benefit analysis. The government recognised that resin workers could be considered managers of agricultural holdings, thus benefiting from agriculture VAT regimes. Moreover, most resin tappers have the problem of lack of activity and income during the 3–4 winter months every year, resulting in low overall annual income (around €15 000 per worker). Since 2014, the province of Soria has supported resin workers through three-month contracts for complementary forestry works[102] mitigating the seasonality of incomes from resin tapping. Soria is a province with a population density below 9 inhabitants km^{-2}, one of the lowest in Europe, with the population decreasing by 42% in the 20th century. Sustaining resin tapping is a strategy devised by the provincial administration to support rural development. The example has been followed by the provincial governments of Guadalajara (2017)[103] and León (2019)[104]. Local and regional authorities and NWFP operators trust that the Spanish *National Strategy against depopulation and demographic challenges*[105] might increase and contribute to these types of support for value chains that are not supported by European schemes.

[99] https://www.researchgate.net/publication/322233935_A_Spanish_Renaissance_Spain's_pine_chemicals_industry_is_on_the_brink_of_a_rebirth
[100] https://www.boe.es/eli/es/o/2014/11/27/hap2222
[101] https://www.resinacyl.es/contenido/la-mesa-la-resina-castilla-leon
[102] http://www.dipsoria.es/actualidad/notas-de-prensa/aportacion-de-la-diputacion-de-soria-de-30000-al-sector-resinero-con-la-concesion-de-20-ayudas-para
[103] https://boletin.dguadalajara.es/boletin/index.php/buscar-k2-menu/1-anuncio/35161-CONVOCATORIA-DE-SUBVENCIONES-DE-RESINEROS-2019
[104] https://www.dipuleon.es/Ciudadanos/Desarrollo_Rural_y_MA/Ayudas_y_Subvenciones_7/RESINA?&i=0&p=1
[105] https://www.lamoncloa.gob.es/consejodeministros/Paginas/enlaces/290319-enlace-reto.aspx

3.2.3 Strengthen equitability and the role of producer organisations

NWFP value chains are normally composed of a very large number of small forest owners or land managers and independent collectors that supply a much smaller number of intermediaries and first processors, frequently highly sophisticated with a good understanding of and access to global markets, that can often operate near to monopsony. As a consequence, primary producers have very limited capacity to commonly address sectoral challenges and very little bargaining power vis-à-vis intermediaries and processors. In order to guarantee the long-term and sustainable development of NWFP value chains it is important to:

- **Increase transparency of price setting.** Provisions under agri-food regulation, such as the recent EU Directive (EU) 2019/633[106] on *unfair trading practices in business-to-business relationships in the agricultural and food supply chain*, are relevant and could be mimicked or extended to food and non-food NWFP, in order to protect primary producers. In addition, decisive steps should be taken to steadily increase transparency in markets. In this respect, well-established, cost-effective, and generally accepted assessment of product quality is a necessary step to increase transparency and trust in price setting.
- **Support price observatories, linked to product quality standards.** Price observatories, linked to product quality an origin, can serve as reference value for individual producers. In this respect, state forest companies, owning large portions of public forests, can play a major role, and set the path for private owners, by publishing qualities and associated tender prices, as well as implementing standard contracts with buyers. Important lessons can be learned from the approach of Portuguese cork producers (Box 10). Also, the Portuguese Institute for Nature and Forest Conservation (ICNF) has created SIMeF[107], a system for monitoring prices of forest products, that aims to help producers of cork, resin, and pine cones.
- **Stimulate, strengthen, and involve producer organisations and cooperatives.** All competent authorities in their respective domains, should stimulate and promote Producer Organisations (POs) and second-level Associations of POs (APOs) as they, in their diversity, represent different levels and approaches to horizontal integration. They typically provide technical and logistical assistance to their members, helping with quality management, transferring knowledge, and advocating

[106] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32019L0633
[107] https://simef.icnf.pt/

Box 10:
Assessing cork quality empowers procurers

In Portugal, a common protocol for assessing cork quality[108] before harvesting and a price observatory for the different qualities have become valuable tools to increase the bargaining power of forest owners, the weakest point of the value chain, helping them receive a fair share of the profits. Similar systems have been promoted by regional authorities in Spain (Extremadura[109] and Andalusia[110]) to provide forest owners and managers with accurate information on the quality of their cork and seasonal market prices. These examples should be extended to other products and countries.

Cork samples with nine years growth showing different thickness and qualities
(Credits: UNAC)

Box 11:
Associations of wild collectors of medicinal and aromatic plants in France and Greece

In France, wild collectors have created the French association of professional wild plant collectors (AFC, *Association Française des professionnels de la Cueillette de plantes sauvages*[111]). The main objectives of AFC are to bring together professionals in the collection of wild plants, namely MAP, to promote the profession of collector, to ensure collaboration with other operators within the sector, and to participate in the horizontal integration of sustainable supply chains by identifying and disseminating good practices in commercial collection. At this stage, AFC focusses on MAP[112], but in the long term it might engage in other wild products such as mushrooms and plants used by other sectors such as ornamentals (moss, lichen, holly, boxwood, etc.), horticulture (snowdrop bulbs, narcissus, etc.), crafts or construction (phragmites/reeds). In Greece, the Association of Medicinal and Aromatic Plants of Greece (EAFFE, Ε.Α.Φ.Φ.Ε.[113]) is a civil non-profit company founded in 2013 with the purpose of valorising the Greek MAP sector, promoting research, production, distribution, and use.

[108] https://unac.pt/images/guia_comercializacao_cortica.pdf
[109] http://cicytex.juntaex.es/es/centros/icmc/servicios/2/plan-de-calas
[110] http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem.7e1cf46ddf59bb227a9ebe205510e1ca/?vgnextoid=88060155290a7210VgnVCM1000001325e50aRCRD&vgnextchannel=4c3b545f021f4310VgnVCM1000001325e50aRCRD
[111] http://www.cueillettes-pro.org/
[112] https://repository.incredibleforest.net/oppla-factsheet/20028
[113] https://www.eaffe.org/

for better regulation and public support. These organisations can provide joint commercialisation services, to increase the bargaining power of their members (Box 11). Moreover, authorities and sectoral stakeholders should facilitate the creation of interbranch organisations (IBOs), to promote vertical collaboration of sectoral associations, and should consider dedicated streams of funding (e.g. through 'operational programmes'), as they provide powerful means to define acceptable commercial arrangements, and mandatory contributions to sustain cooperation activities along the value chains. IBOs have existed in some agricultural sectors for more than 50 years; however, they are extremely rare in the NWFP sector in Europe.

In most Mediterranean countries, forest producer associations have been relatively weak in terms of capacity, resources, authority, and political vision for the forestry and NWFP sectors. They are often merged within farmer associations, where forestry loses out in competition with agriculture or animal rearing, and NWFP lose out in competition with timber. In Middle East and North African countries, Greece or Cyprus, where most forests are public, producer organisations face specific challenges. Inspiration and good examples can be found in France (UCFF, Union de la Coopération Forestière Française[114]) or Portugal[115] (UNAC[116], APCOR[117], etc.), and in central and northern European countries where there is a long tradition of forest associations and cooperatives.

Finally, dedicated support should be granted to create necessary cross-border and international linkages and cooperation platforms for producer associations and cooperatives. Their relevance cannot be overestimated. Interesting references are international events and initiatives such as BioCASTANEA[118] or TRUFFORUM[119], and international associations such as the European Mycological Institute[120] or the European Truffle Association[121].

[114] https://lescooperativesforestieres.fr/
[115] https://www.researchgate.net/publication/303882040_Forest_Owners'_Organisations_in_Portugal
[116] https://www.unac.pt/
[117] https://www.apcor.pt/
[118] http://biocastanea.es/
[119] https://trufforum.com/
[120] https://eumi.eu/
[121] https://www.facebook.com/EuropeanTruffleAssociation/

Photo by: © mrfotos / Shutterstock

3.3 Providing transparency, data, and information flow on NWFP

*Supply-chain transparency requires that: (i) all **operators** involved (including in production, manufacturing, trade, retail, etc.) are well known; (ii) the characteristics of **goods and services** exchanged are precisely determined; and (iii) that consumers, operators, and authorities have an adequate and balanced knowledge of **qualities and prices.***

It is necessary to improve the information provided about the legality and sustainability of business practices as this will promote consumer confidence in forest products, including NWFPs, and contribute to the prevention of fraud and unlawful practices. It is also vital to safeguard the health and safety of communities, as well as monitor the evolution of markets and trade, and the uptake and pressures on natural resources.

Unfortunately, on European store-shelves and online sites, products are often inadequately classified (and labelled), failing to distinguish those NWFP coming from different botanic species, ecological origins, or production and processing practices. They often lack guarantees of sustainable, fair, or equitable harvesting and trade, and may have unspecified properties and qualities. Frequently, the low cost of imported substitutes vs traditional local specialities, puts extra pressure on price and profitability, and weakens producers both in the country of origin, but also in the country of destination. Moreover, traditionally informal grey markets are further darkened by lack of data, or incomplete official data, on collection, processing, and trade. Mainly large volume traders benefit from this consumer confusion. To overcome this situation, action is needed to: (i) improve the visibility of NWFP in trade; (ii) improve traceability; and (iii) facilitate access to data on production, commercialisation, and trade.

Focus 4.

Confusion about the origin and properties of NWFP in Europe

Natural resin competes with fossil-based derivatives due to classification pitfalls.
European natural resin products, mostly rosin and turpentine, compete with fossil-based alternatives with no differentiation in official statistics, and no information provided to secondary processors and consumers. *The International Convention on the Harmonized Commodity Description*[122], does not distinguish natural resin products and tall oil-based products from the fossil-based alternatives. Improved classification systems, e.g. through a unique code for 'crude pine oleoresin', would allow markets to be monitored and sustainability criteria to be established. More ambitiously, they could also allow the tree species or origin to be distinguished, opening new opportunities to valorise both the quality of the product and the sustainability of the resource.

Pine nuts and chestnuts on your store shelf - Mediterranean or Eastern Asian imports?
Mediterranean pine nuts — collected exclusively from the stone pine, a typical species of western Mediterranean landscapes — are a gourmet ingredient in traditional cooking. In the last decades, they have faced strong and increasing competition from much cheaper Asian pine nuts[123], despite their very different taste and nutritional properties. The generic labelling of pine nuts, Pinienkerne, piñones helps to obscure precarious working conditions or illegal trade (as in the Russian Far East or Afghanistan) and confuses consumers, with variable quality or flavours. Moreover, international trade codes do not allow for a distinction between pine species in trade declarations, obscuring market traceability, and making Mediterranean pine production and trade invisible.

Similarly, in European supermarkets peeled chestnuts are labelled as "CHÂTAIGNES processed in FRANCE"; however, when reading the small print, they can turn out to be imported Chinese chestnut (*Castanea mollissima*), a different species from the European sweet chestnut (*C. sativa*)[124].

3.3.1 Improve visibility of NWFP

Sufficient and reliable data and information on NWFP is vital for the development of effective policies and strategic planning of land and forest resources, and increasingly to contribute effectively to food system policy measures. However, many NWFP are not, or only poorly, accounted for in official statistics. There are several reasons for this. The predominance of grey and informal markets, the large array of NWFP with multiple end-uses, limited statistical capacities in many countries, and failures to harmonise terminology are some of the key challenges that need to be overcome[125]. For this, several steps can be taken at different scales to improve this situation. These include:

- **Establish databases with priority, high relevance NWFP at European and country-level.** These should be established according to agreed international criteria determined by the World Customs Organization (WCO), namely: (1) global trade in the order of > US$50 million; (2) whether there are environmental concerns associated with production; and (3) whether the NWFP is important for food and nutrition security, particularly for lower- and middle-income countries[126]. These lists could then be expanded to a larger number of NWFP in subsequent phases[127]. While, ideally, the list would be developed at a species level, the high diversity of NWFP will necessitate, in some cases, the aggregation of data at a genus or other taxonomic levels, as is the case of the Turkish list (section 3.1.3, Box 2). Eventually, the list could identify the different *primary* products derived from a given taxa (e.g. leaves, bark, nuts), to allow for greater clarity on end uses. For example, the Mediterranean stone pine (*Pinus pinea*) would appear in the Portuguese list as a provider of resin and pine nuts, but also potentially for the open cones for crafts and decoration and essential oils, if those new uses were to reach the agreed minimum level of consumption or trade. National correspondents for the FAO Forest Resources Assessment could lead the way, setting a NWFP reporting 'standard' adequate for all priority NWFP in a more consistent manner. Based on the national lists, a *European list of the main NWFP* could then be created and kept updated, well harmonised with the existing list of agricultural products. Capacity building for mandatory reporting in advisory services, institutions and professionals should be promoted, addressing, at least, the species listed in each country.

[122] http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs_convention.aspx
[123] https://repository.incredibleforest.net/oppla-factsheet/20253
[124] https://www.unece.org/fileadmin/DAM/trade/agr/standard/standard/fresh/FFV-Std/English/39_SweetChestnuts.pdf
[125] Muir G, Sorrenti S, Vantomme P, Vidale E, Masiero M. Into the Wild: Disentangling Non-Wood Terms and Definitions for Improved Forest Statistics, International Forestry Review, 22(1), 101-119, (8 April 2020) https://doi.org/10.1505/146554820828671553
[126] https://unstats.un.org/unsd/classifications/expertgroup/egm2015/ac289-15.PDF
[127] https://doi.org/10.1505/IFOR.5.2.156.17412

- **Improve official NWFP reporting in International Statistical Classifications Systems.** National reporting should be compatible with, and enrich, existing international classification systems, namely: the Harmonized Commodity Description and Coding System (HS; developed and maintained by WCO); the Central Product Classification (CPC; developed and maintained by the United Nations Statistics Division, UNSD), the *International Standard Industrial Classification of All Economic Activities* (ISIC; developed and maintained by UNSD)[128]. Much like what is already done with timber statistics through the Inter-secretariat Working Group[129], a similar initiative could be envisioned to minimise the reporting burden on countries and avoid confusion arising from discrepancies in information, and at the same time maximise cooperation between different entities on NWFP statistics.

  In the latest revision of the HS2022, FAO facilitated among others, the inclusion of 10 new product codes for NWFP[130]. These include pine nuts (with the distinction of inshell and shelled pine nuts) and mushrooms (with the recognition of several genera, like *Boletus, Cantharellus, Tuber,* and others). More steps in this direction are needed – in coordination with FAO and UNSD – and particularly with respect to *activity classifications*, which show promise for capturing wild harvest activities with greater ease[131].

  A clear priority would be to clarify the boundaries between agriculture and forestry in international classification systems, and specifically with respect to the *placement of wild vs farmed products* in the agricultural and forest product statistics of the CPC classification. The current confusion has 'disguised' many NWFP as agricultural products (all those that can be domesticated even when produced in forest plantations or collected from the wild). Paradoxically, for example, chestnuts are considered *agricultural products*, while the timber from those same trees is classified as a *forest product.* This situation makes the contribution of forests to food security, livelihoods, and trade, ever more complex to untangle, with impacts in forest policies that are difficult to estimate with any accuracy[132].

  Alignment with other mechanisms including chemical and biodiversity databases[133] – like the European Chemicals Agency (ECHA) or the CAS (Chemical Abstracts Service) of the American Chemical Society for chemicals, and the European Nature Information System (EUNIS) classification[134] for biological species and habitats – would strengthen the link with biodiversity and habitats conservation and facilitate international trade. For instance, because there are no CAS codes for pine resin or rosin, they have to be shipped as turpentine, which means that higher insurance premiums must be paid.

- **Integrate NWFP in individual/ household consumption surveys.** Obtaining better data on diets is a global priority[135], and it is important to overcome the historical under-reporting on the contribution of NWFP to diets. This renewed interest provides an opportunity to better account for wild and semi-wild forest foods in large-scale, systematic dietary surveys that are currently taking place in hundreds of countries. The information obtained, will be vital to better understand the relationship between food security, nutrition, and forests, and particularly, the contribution of NWFP to healthy diets. FAO is currently working in this direction, developing improved methods to capture these and other neglected and underutilised species in dietary assessments.

- **Complement information by targeted sectoral and market surveys.** While necessary, the above measures will not be sufficient to fill the long-standing gaps related to NWFP data, inasmuch as NWFP use is still largely informal and subsistence in nature. Other complementary measures should be taken. These include, for example, more targeted sectoral surveys such as the EU StarTree survey[136] which led to an unprecedented level of information on the extension and social implications of wild harvesting in Europe.

  Furthermore, different sectoral organisations and industrial operators, have a wealth of information at their fingertips. Making this information *open access* — to the extent possible — would mitigate gaps in international and national statistical data collection activities in countries over-stretched by reporting burdens. Even if they are not systematically or regularly conducted, these types of surveys and reports, fill important knowledge gaps and allow for a better analysis and understanding of the multiple dimensions of NWFP value chains.

  For instance, pine resin is a global commodity produced in more than 30 countries of Asia, America, Africa, Europe, and Oceania, and obtained from more than 10 pine species (Cunningham, 2012)[137] including *Pinus massoniana, P. yunnanensis, P. merkusii, P. elliottii, P. caribaea, or P. pinaster,* from natural and planted stands. But no international statistics provide information on the production, productivity, or prices by country, species, or origin. Private companies might be able to partially fill these gaps, but their information is not generally accessible.

128 cf. http://www.fao.org/documents/card/en/c/a20a4c35-3bf5-4bc6-8e90-567f1468cc4f/
129 http://www.fao.org/forestry/statistics/iwg/en/
130 http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2022-edition.aspx
131 cf. https://www.ingentaconnect.com/contentone/cfa/ifr/2020/00000022/00000001/art00007#
132 cf. http://www.fao.org/forestry/47491-0eff10111c6244d2ee82d9ddf1ba5a02b.pdf
133 https://echa.europa.eu/; https://www.cas.org/support/documentation/cas-databases
134 https://eunis.eea.europa.eu/
135 https://www.nature.com/news/a-new-global-research-agenda-for-food-1.21052
136 https://doi.org/10.1016/j.forpol.2020.102175
137 https://www.academia.edu/32774574/Pine_resin_tapping_techniques_used_around_the_world

Summary recommendations for improved NWFP reporting

I. **Improve country capacities to report on priority NWFP as per international statistical criteria.**

II. **Continue to work through international classification systems to provide more detail on products traded, and especially to allow for a clear distinction between *agricultural vs forest* products and *wild vs farmed products*, in a similar way to the legal distinction between wild fisheries and aquaculture.**

III. **Differentiate primary products from *derived or secondary products* when and if possible. Primary products include pine cones, fresh mushrooms, bundles, twigs, and leaves, while secondary products include pine nuts and dry cones, dried mushrooms, and essential oils.**

IV. **Enhance existing surveys (e.g. dietary) to improve reporting on edible NWFP and support complementary methods when possible (such as periodic sectoral surveys, market surveys, value chain studies) to gather additional information necessary for development of evidence-based policies.**

V. **Promote public–private collaboration to adequately capture, production modes, technical descriptions, quality standards and material safety data sheets (MSDS), etc. Sectoral organisations should gather and make openly available, relevant information on: who the operators are; areas of production; primary and derived products and sub-products; quantities produced and traded; and, ideally, prices by product qualities or categories.**

VI. **Identify and disseminate the safety credentials of relevant products and end uses, publishing them in the reference chemical databases (e.g. European ECHA or the American CAS).**

3.3.2 Ensure traceability and encourage innovative labelling

Traceability systems provide information on the origin, the process, and the operators involved in the value chain. Such systems are needed to guarantee safety, sustainability, and fair competition in the market, respecting consumers' rights to informed purchase decisions. It is also important to develop tools to engage consumers and to leverage the intrinsic value of NWFP, which is linked to their origin, production mode, and properties of the NWFP. In Europe there are major traceability failures in relation to food NWFP (where traceability has been mandatory for over a decade now) and non-food NWFP, that need to be addressed systematically.

- **Enforce compliance of edible NWFP with food traceability and labelling requirements** (e.g. Regulation EC-178/2002 and derived national regulations), addressing the major implementation gaps that remain for wild-collected NWFP, even when they are explicitly considered as a *primary product.* For example, the imported truffles, mushrooms, nuts or berries consumed in Europe are not distinguished from those which are locally produced or with origin in the EU. The distinction between wild and cultivated production is also often confusing. Tracing products from the wild, requires innovative solutions at the initial *entry-into-the-market step.* Inspiration can be obtained from fish products, where there is a clear distinction between wild-caught and farmed products, and well-established worldwide production areas. Improved traceability is also of great concern in the case of pharmaceutical and nutraceutical products.

- **Establish legal traceability standards and due diligence systems** to minimise the risk of unsustainable or non-ethical practices for non-food NWFP. This could build on instruments developed within the EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan, such as the European Timber Regulation (EUTR), that establishes due diligence systems for timber imports, but not currently for NWFP imports.

- **Encourage voluntary certification and quality standards** to facilitate and guarantee sustainable and legal collection and respect for collectors' rights in third countries and to support implementation of relevant international Conventions such as CITES and the Rio Conventions (UNFCCC, CDB, UNCCD). Several third-party certification schemes, such as PEFC (Programme for the Endorsement of Forest Certification) or FSC (Forest Stewardship Council), on sustainable forest management do certify NWFP[138]. The FairWild[139] certification scheme aims to ensure

[138] https://www.pefc.org/; https://fsc.org/en
[139] https://www.fairwild.org/the-fairwild-standard

the sustainability and fair trade of plants collected in the wild. There are many certifications of relevance to NWFP (organic, environmental performance, quality and food safety, socio-economic aspects like Fairtrade, etc.)[140]. However, their use is rather limited. It is important to understand and overcome the barriers (often related to the cost of certification) that prevent uptake of otherwise promising certification schemes. Private–public initiatives are needed to encourage the uptake of the schemes, and to successfully implement innovative approaches, such as *Participatory Guarantee Systems* (PGS), that can greatly reduce costs of compliance audits and monitoring (Box 12).

- **Inform and educate consumers through guarantee of origin.** An increasing number of customers choose products with a recognisable origin, ascertained through voluntary schemes, such as Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Tradition Specialities Guaranteed (TSG). Although there are many examples of successful implementation of these schemes that can radically increase the market value of NWFP, there are also less successful examples in which implementation costs cannot be recovered. A solid and comprehensive approach is needed, such as that proposed in the FAO publication *"Linking people, places and products — A guide for promoting quality linked to geographical origin and sustainable geographical indications"*[141]. Several good examples already exist in Mediterranean Europe for mushrooms, truffles, chestnuts, and aromatic plants[142]; other examples cover secondary products based on NWFP[143].

- **Leverage the potential of mobile ICT solutions for labelling and traceability.** Different digital solutions to facilitate traceability and labelling of NWFP are emerging, as private or public initiatives. They typically provide information on producers, ingredients, and cultivation, harvesting, and processing methods, well beyond what is reflected in the physical label. DNA barcoding can become an important tool to address challenges related to illegal collection and trade of endangered species or of specific populations, including valuable natural hybrids. QR codes are also being tested for example in apiculture for tracing honey back to the hive[144].

[140] https://www.researchgate.net/publication/343555733_Economics_marketing_and_policies_of_NWFP
[141] http://www.fao.org/3/a-i1760e.pdf
[142] such as Fungo di Borgotaro I.G.P., Tartufo Nero di Fragno, Castanha da Terra Fria, Setas de Castilla y León, Cèpes du Périgord, or Thym de Provence
[143] for instance Orujo de Galicia, Cantueso alacantí, Pacharán Navarro
[144] https://www.izslt.it/bpractices/en/the-traceability-system/

Box 12:
"Nature & Progrès" — a participatory guarantee system

Photo by: © vaaseenaa / Adobe Stock

Nature & Progrès[145] is a French association and the name of a label which is used by food and cosmetic products that aim to respect the environment, people, and animals. The label is based on the specifications of Nature & Progrès — including MAP collection practices — and the commitment of its members through a charter. The members of the association, consumers and professionals ensure compliance to the established specifications, in a Participatory Guarantee System, supported by IFOAM — Organics International (the International Federation of Organic Agriculture Movements).

Box 13:
The INCREDIBLE knowledge repository

This repository[146] is a unique and user-friendly database that highlights numerous and diverse aspects of NWFP that represent a source of revenue and development for Mediterranean rural societies and beyond. This knowledge was gathered and structured thanks to the effective 'animation' process of communities of practitioners–researchers. This collection of factsheets aims to bridge the gap between researchers and practitioners, by collecting, disseminating, and communicating relevant information on NWFP innovation from a diversity of sources, such as success stories, best practices, databases, technical reports, policies, research, and literature reviews.

Photo by: © INCREDIBLE project

[145] https://www.natureetproges.org/
[146] https://repository.incredibleforest.net/

3.3.3 Facilitate access to data and market information

- **Promote studies of costs, rents, trade, and prices for NWFP production systems.** These types of studies are relevant for producers, policy makers, and other stakeholders, to evaluate the performance, and profitability of holdings and operators in each sector. While some analyses are regularly conducted, there is a lack of systematic and comparable studies. Increased coordination among institutions and producer or processor associations that own the necessary data would enable such studies to be conducted. In this respect NWFP associations and central food markets are an important source of information on trade and prices.

- **Promote knowledge sharing through good practice guidelines and ICT platforms.** Good practice manuals define practices that guarantee sustainable management of natural resources and often represent the starting point for certification. They can be used as a basis for reference agreements between landowners and pickers, as in some local initiatives for cork, mushrooms, and resin in Portugal, and for wild plants in France. As a matter of priority, these types of manuals should be widely disseminated and developed for as many species as possible. Moreover, they should be designed in strict cooperation with producers, as in the case of French MAP pickers[147].

  ICT platforms such as the OPPLA database on Natural Capital and Good Practices[148] are ideal tools for sharing an increasing knowledge base. The INCREDIBLE project has created an open repository[149] within OPPLA, and contributed 250 factsheets, describing good practices and innovations in the NWFP sector (Box 13). It is important to maintain and interconnect these types of initiatives to overcome the short-lived nature of competitive research funding.

[147] https://repository.incredibleforest.net/oppla-factsheet/20463
[148] https://oppla.eu/
[149] https://repository.incredibleforest.net/

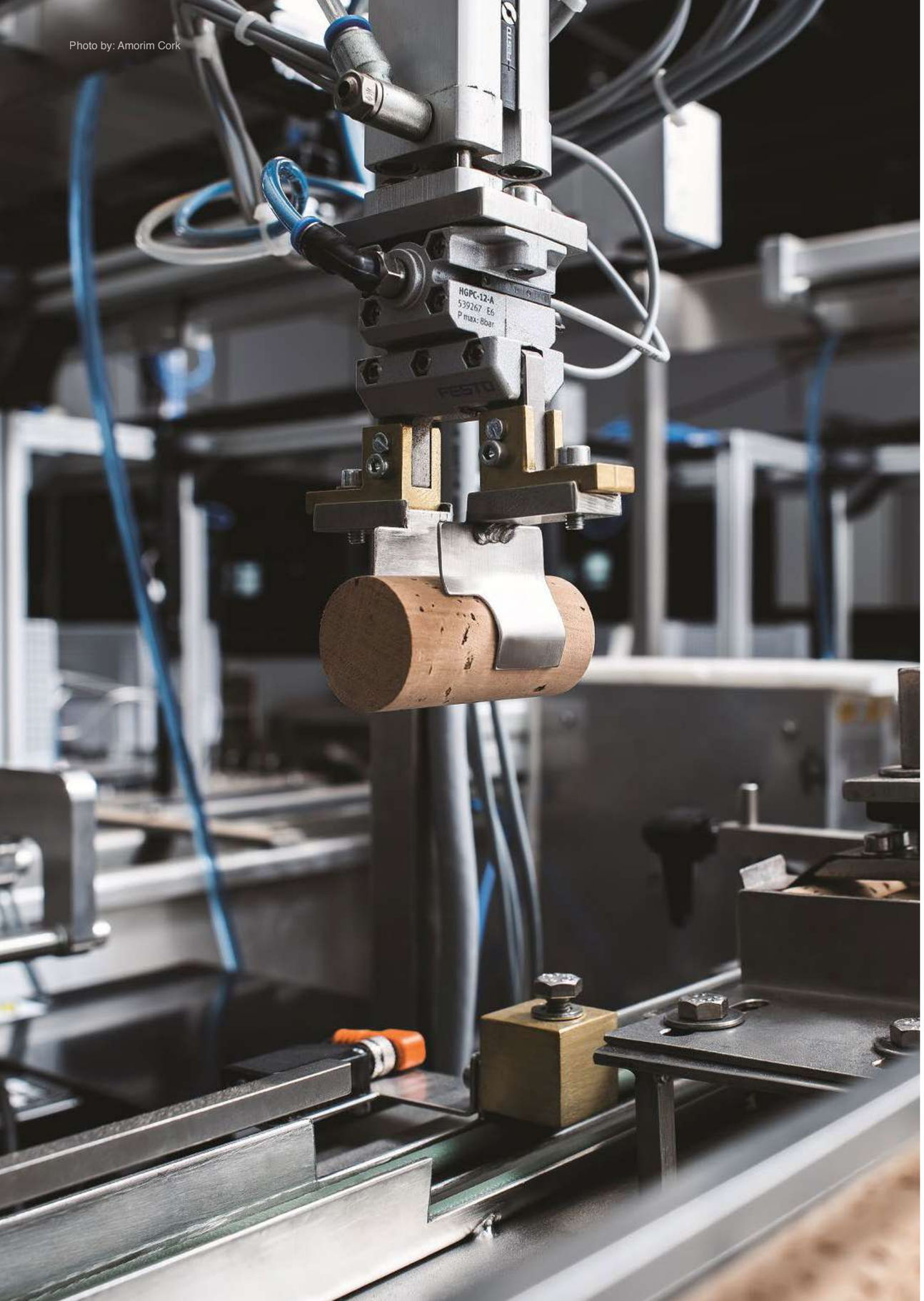

Photo by: Amorim Cork

3.4 Creating enabling conditions

Developing a shared vision that can underpin and provide coherence to the different policies affecting NWFP, along with better targeted financial instruments in support of the forestry and agroforestry sectors, is the most relevant enabling condition for the effectiveness of the actions described in the previous sections.

3.4.1 Increase policy coherence across all relevant policy domains

In order to bring coherence to this fragmented and multi-faceted sector, it is important to advance towards more coherent action across different policy areas related to NWFP, including nature conservation, rural development, tourism, agri-food, industry, bioeconomy labour, taxation, and trade. This will only be possible by creating shared visions on the sustainable and desirable future of (key) NWFP in particular and forested landscapes in general. Some valuable elements to advance towards those shared visions could be:

- **Work towards a consistent approach to nature and landscape conservation** that aims to preserve the inter-linked natural and cultural heritages, including traditional management practices. This is especially relevant in Mediterranean countries like Spain, Greece, or Cyprus that already have some 30% of the land area under Natura 2000. The lack of consensus among stakeholders on the role of forestry and land management for nature conservation can damage agro-ecosystems with a high conservation value. An example is the effect of reduced sheep grazing in evergreen oak coppices (priority habitat 9340) in central Spain; the reduced grazing has led to reduced black truffle production and reduced biodiversity of this habitat. Another example is the abandonment of cork oak forests in Sardinia, Italy. Multi-purpose management of forests as social and ecological systems does not preclude, but supports, conservation[150].

[150] Bugalho et al., 2011. https://www.researchgate.net/publication/235933658_Mediterranean_cork_oak_savannas_require_human_use_to_sustain_biodiversity_and_ecosystem_services

Focus 5.

Fragmented governance in NWFP: wild mushrooms

Across Europe, in the wild mushrooms sector, the roles and responsibilities are typically fragmented in different administrative silos:

A. the administration dealing with forestry may define conditions for collection and harvesting and control of picking permits;

B. picking often takes place in nature conservation areas, under the responsibility of environmental authorities;

C. the administration dealing with for food safety may be responsible for registration of operators and the production areas, in order to comply with the EU regulations on food hygiene[151];

D. the administration dealing with *primary food markets,* which might be local administrations of rural areas, typically oversees the supply to industrial processors;

E. *local authorities* are the authorities that control the main central city food markets, where the main distribution to retailers take place, etc.

As a consequence, only through shared information, visions, and goals, will it be possible to create the policy environment to stimulate and steer the NWFP value chains.

- **Comprehensively reveal the social and ecological dimensions of NWFP** in forests and agroforestry systems, including wild, semi-wild, and domesticated production. This would facilitate the adoption of '*NWFP aware*' sectoral policies and could remove unintended barriers to NWFP development and better contribute to desired policy goals (e.g. in relation to food safety, rural development, nature conservation). Some of the most troublesome barriers concern the lack of support or negative incentives resulting from taxation or labour regulations, or conditions for accessing CAP support; however, there are also barriers related to legal uncertainties or cumbersome product classification for specific uses, which need to be addressed.

- **Support compliance with food and chemical safety regulations.** This would require decisive support to producers and processors in the compliance with complex and expensive regulation, as is the case of the safety classification for resin derivatives and essential oils in the *European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals*[152] and the *Classification, Labelling and Packaging Regulation*[153]. For example, for natural resin derivates, a review of the use of gum rosin derivatives as food additives[154], like E445, based on up-to-date scientific data, could open important added-value markets. In the case of food derivatives, solving the traceability conundrum is the first priority as discussed in section 3.3.2. The limited commitment by different administrations, the lack of knowledge about their responsibilities, or lack of adequate resources limits the implementation of mandatory traceability requirements.

- **Establish a level playing field that implements circular economy approaches,** to secure positive environmental impacts, climate change mitigation, and resource efficiency, and in which positive externalities are internalised in markets through innovative mechanisms. This could mean, for example, the removal of incentives to burn crude tall oil as a biofuel[155], and thus, opening doors for higher added-value products and a stronger pine-chemistry sector based on natural resin and tall oil derivatives.

- **Adapt the CAP to better support NWFP conservation and development.** The CAP and the Rural Development Programmes are the most important sources of income and finance for landowners and farmers, and are therefore relevant in orienting land management practices. They have a strong potential to encourage NWFP production in view of their contribution to multi-functionality, quality foods, and territorial

151 EU-178/2002 and EU-852/2004
152 REACH
153 CLP
154 https://ec.europa.eu/food/safety/food_improvement_agents/additives/eu_rules_en
155 https://www.pinechemicals.org/news/227469/Bio-based-chemical-industry-victim-of-EU-biofuel-reform.htm

development. In order to effectively achieve this, the following issues should be addressed:

- EU regulation should address, in a more strategic and consistent approach, the distinction between agricultural land and forest land in Europe, and especially clarify the legal regime of agroforestry land. This would improve the current situation, in which inclusion of some NWFP as agriculture, opening a completely different legal and support regime, seems arbitrary, or dependent on the lobbying capacity of countries or large operators.

- It is important, to remove perverse incentives, and to recognise within the CAP, the extraordinary ecological and cultural value of traditional and sustainable land uses, and particularly agroforestry systems, that are today largely neglected. This is the case of the CAP provision that excludes the area occupied by trees (except orchards) in any given agricultural piece of land from the extent eligible for subsidies, resulting in premium incentives for farmlands void of trees. This is having a negative effect on NWFP rich agroforestry systems, such as cork oak (*Quercus suber*) and holm oak (Q. *ilex*) dehesas and montados, as farmers are incentivised to remove trees and intensify agriculture, reducing multi-functionally and jeopardising the long-term sustainability of the land.

-The strong focus on the farm level, leaves harvesters and collectors of wild NWFP outside of support lines. Recognition of these type of operators should be pursued in future iterations of the CAP, integrating wild product pickers within the farm activities. In addition, specific support to forestry and agroforestry practices that benefit the sustainability and production of NWFP should be increasingly included into CAP and the Rural Development Programmes measures such as, for example, stand thinning and inoculations to improve mushroom production.

Photo by: © Aybars / Adobe Stock

- **Develop coherent programmes for key NWFP sectors at different scales.** One of the most effective ways to increase policy coherence is through comprehensive plans or programmes on specific NWFP sectors from global to regional levels (Box 14). The successful experience of National Apiculture Programmes coordinated by the European Commission and supported by CAP and matching national funds, could be replicated for other relevant NWFP, as this would allow coordination of actions across policy domains. These plans are not a guarantee of successful development since markets might act in unexpected ways, as they have with the massive imports of low-quality or adulterated honey; these consequences have proved difficult to counter.

Programmes should address sub-sectors with similar characteristics, differentiating wild and cultivated products. Candidate sectors for coordinated national programmes are:

- Cork
- Pine resin and tannins
- Truffles (white and black)
- Wild mushrooms
- Nuts and berries
- Medicinal and aromatic plants
- Vulnerable NWFP[156]

These programmes should be prepared on the basis of strong science and stakeholder participation, and address areas such as: (i) Information and statistics; (ii) Resource conservation, management, and planning; (iii) Domestication; (iv) Regulation, sectoral contracts, finance, taxation, and trade; (v) Processing, marketing, and rural development; (vi) Governance — structuring value chain, sectoral organisation and administrative coordination; and (vii) Training, education, extension, and research.

At the European Union scale, coordination of national/regional plans and programmes should be pursued. Coordination at other international levels, such as the Mediterranean level, through FAO's Silva Mediterranea[157] or other committees or initiatives, is also recommended. Programmes can be funded by member states, regions and operators, and supported by the European Agricultural Fund for Rural Development (EAFRD)[158] or other structural funds, but these resources could be used more intensively, and better targeted (see Box 14).

Photo by: © Maxpixel

156 cf. annexes of the https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043
157 http://www.fao.org/forestry/silva-mediterranea/88929/en/
158 https://ec.europa.eu/regional_policy/en/policy/what/glossary/e/european-agricultural-fund-for-rural-development

Box 14:
Sectoral plans and programmes for NWFP

Photo by: © mirkograul / Adobe Stock

Honey is the only NWFP sector for which the national programmes are coordinated at the EU level, through National Apicultural Programmes (NAP), supported by a specific budget line within the CAP[159]. For 2020–2022, the EU contribution is €40 million yr[160]. National and regional matching funding increases the available resources for the implementation of the NAP to over €80 million yr^{-1}, for a sector of 600 000 beekeepers, with 16 million hives, producing 250 000 t yr^{-1} of honey. The EU is the second biggest producer (with 12% of world production)[161].

At the national scale, the **Italian Ministry of Agriculture, Food and Forests** (MiPAAF) has set up multi-actor working groups dedicated to specific NWFP value chains — such as truffles, cork, nuts, and MAP — in order to develop new national plans, or to update existing national plans. The recently realised National Truffle Plan (2017)[162] sets specific actions to achieve the following objectives: (1) national coordination of collection rules; (2) plan for production of truffles; (3) increase the level of knowledge of advisory services; (4) traceability of nursery propagation material; (5) definition of research lines on truffles; (6) coordination with European regulations; (7) redefine the tax system applied to the truffle; and (8) more efficient controls. Similar comprehensive plans for other NWFP sectors are in the pipeline. Similarly, in 2017 the **Ministry of Rural Development and Food of Greece** published the *Strategic Development Plan for the cultivation, processing and marketing of Aromatic and Medicinal Plants in Greece*[163], to ensure conservation of its rich biodiversity and to develop market high added-value products for the food, cosmetics, pharmaceutical, and plant protection sectors. The plan addresses key aspects related to protection of endemic species and populations, domestication, quality, and hygiene, organisation of producer groups, traceability, research, training, education, and awareness raising.

Outside the EU, Turkey, through the General Directorate of Forestry (GDF)— Department of NWFP and Services, established in 2011 — has approved seven NWFP programmes since 2014: resins, bay tree (*Laurus nobilis*), Vaccinium berries (*including lingonberry Vaccinium vitis-idaea; blueberry V. myrtillus, Caucasian whortleberry V. arctostaphylos, bog blueberry V. uliginosum*), truffles, mastic (*Pistacia lentiscus*), orchids, almonds (*Prunus dulcis*), and forest honey. These programmes are providing relevant information on resources and markets, allowing forest management to be improved and diversified, and particularly increasing the living standards of the inhabitants of forest villages, as well as increasing the international trade results of Turkey. Each plan has a similar format: introduction to the NWFP; geographical distribution and inventory; conservation, management, and utilisation rules; and procedures to be applied by GDF. As of 2019, the contribution of NWFP to the national economy was calculated as US$880 million and the contribution to forest villagers as US$123 million. NWFP are also an important export, and in 2019 approximately US$200 million (thyme, laurel, chestnut, pistachio, pine, etc.) was exported, mainly to European countries.

Photo by: Aromas del Encinar. Jesús Fernández Moya

[159] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31997R1221; https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R1366
[160] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019D0974
[161] https://www.ema.europa.eu/en/action-plan-herbal-medicines-2010-2011
[162] http://www.tartuficoltura-e-ambiente.it/wp-content/uploads/2017/12/piano_completo_finale_versDefinitiva20novembre2017.pdf
[163] http://www.minagric.gr/images/stories/docs/agrotis/Aromatika_Fyta/stratighko_sxedio_aff260218.pdf

3.4.2 Improve financial support

Although some NWFP can benefit from CAP direct payments, the main financial support for the primary production of NWFP in Europe comes from the EAFRD through measures that support forestry, as well as through cross-cutting measures in support of rural business, competitiveness and employment, and horizontal and territorial cooperation, including the strengthening of producer organisations, training and skills, etc. In addition, support can also be provided by the *European Regional Development Fund* (ERDF) (e.g. interregional cooperation) or the *European Social Fund* (ESF) (in support of employment and inclusion). EU funds are strategic, and they mobilise national co-funding.

Despite the lack of a comprehensive evaluation, the financial support to NWFP, is rather small, fragmented in isolated initiatives, and widely unbalanced across countries and regions; this is also the case of forestry measures in general[164]. To improve this situation, it is necessary to:

- **Define eligibility for NWFP and agroforestry land in the CAP direct payments.** It is important to address the gaps and inconsistencies on the list of products that are eligible for support in *pillar one*[165]. There are inconsistencies and grey areas with respect to the NWFP that are included or covered within CAP. Notably, those NWFP coming from agroforestry systems are generally excluded, and those produced in managed forest systems are sometimes included (e.g. cork, chestnuts, cultivated truffles, and most cultivated MAP), but many are excluded (e.g. pine nuts, resin, and most wild products). Harmonisation of the list of agricultural products is needed, together with the recognition of the production method of wild/ forest products, through a specific label.

- **Promote integrated approaches related to rural development programmes.** The EAFRD offers opportunities to support sustainable and equitable NWFP value chains, and also to maximise positive impacts in rural development and climate change adaptation. Countries and regions should tap into these opportunities within the EAFRD, as forestry and NWFP in particular, are generally receiving very limited and fragmented support. For this to become true, stronger political will, better structured sectors, and more integrated approaches are needed. Elements could be facilitated through comprehensive national or regional NWFP plans.

- **Adjust rural development funds and direct payments.** At the national, regional, or provincial levels, a lack of official *standard output values*[166] associated with NWFP quite often limits the possibility of producers to benefit from rural development funds and direct payments. Whenever there is a value for a managed or cropped NWFP, the associated standard output values are often so low that a farmer is not eligible for any CAP policy measures. Working tables at the ministerial or regional levels should provide adequate and consistent variety of NWFP and related standard output values that can be produced in farmland and forest (e.g. number of working days per hectare, annual production per hectare in terms of quantity and turnover).

- **Better support NWFP within existing programmes and available funding sources.** There are many other funding opportunities for NWFP that seem to be underutilised. Awareness raising and capacity building among NWFP operators and increased political visibility vis-à-vis management authority will facilitate the uptake of resources from ERDF, ESF, and Life[167], and their equivalents outside the EU. While NWFP producers and associations should increasingly search for alternative sources of funding, some new instruments may be required. For example, the European Investment Bank (EIB) has made a commitment to support bioeconomy and climate change action and is supporting forestry[168] and forest-based industries, but its instruments are designed for large investments. Financial support lines that sustain small collectors or traders of wild forest products belonging to the SME category through micro-credit should be sought.

Photo by: © Nectariss (Truffled organic oils)

[164] Support for forestry measures in EAFRD 2014-2020 period represented only €6.4 ha-1 yr-1 and less that than 5% of all funding (EU Commission SWD (2019)-391). Total public expenditure in support of forests and forestry (including national and regional funds) was estimated at €17.9 ha^{-1} yr^{-1} in 2013, varying from less than €5 ha^{-1} yr^{-1} in Bulgaria to more than €105 ha^{-1} yr^{-1} in Hungary (State of Europe's Forests-2015). In contrast, EU Commission recommends and investment of €75 ha^{-1} yr^{-1} in managing Natura 2000 (not accomplished!) and invests €320 ha^{-1} yr^{-1} in agriculture.

[165] Annex 1 of https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32008R1242&from=EN

[166] a parameter that allows the calculation of a theoretical (standard) annual gross production of the holding based on the type of cultivation (Regulation 1242/2008)

[167] https://ec.europa.eu/easme/en/section/life/life-close-market-projects

[168] https://www.eib.org/en/publications/rejuvenating-forests

3.4.3 Foster innovation, knowledge transfer and extension capacity

The creation and dissemination of knowledge, from science and experience, is a necessary condition for sustainable development and also, evidently, for NWFP. It is important to increase the investments in research, but also to build capacities to supporting innovation, the uptake of knowledge, and the development of professional skills. More specifically:

- **Build a systemic approach to promote innovation.** The experience of the European Innovation Partnerships, and its deployment in Thematic Networks and Operational Groups, are proving valuable in advancing towards multi-factor research, iterative innovation, and knowledge exchange. More efforts are needed in this direction. Moreover, facilitation of this knowledge-sharing processes needs to be complemented with a consistent approach to identify and overcome other barriers to innovation, such as those deriving from regulation, lack of social capital, difficult access to financial or other resources, etc.

- **Increase research attention to the social-ecological dimensions of NWFP.** While there is a thriving research community addressing NWFP, more can be done to favour transdisciplinary and transnational research cooperation. Moreover, formal forestry research and education is still very much skewed towards timber and would benefit from better integration of NWFP. Specifically, knowledge and skills are needed on the interactions between forest management and the production and collection of different NWFP that may be co-produced and/or collected together.

- **Develop capacities in rural development agencies** so they can better support NWFP entrepreneurship, and specifically, empower those agencies in the development of territorial marketing strategies, as they require the concerted effort of multiple actors at different levels, and maybe be out of reach for individual entrepreneurs.

- **Strengthen forest advisory services,** that are currently underdeveloped in most European countries, in synergy with farm advisory services. In this respect, increased attention is required to: support social innovation; develop innovative business models; incorporate mechanisation and digitalisation; reinforce and integrate information systems; strengthen value chains and sectoral organisations; and improve governance.

- **Increase the attention given to NWFP in vocational training schools,** and provide increased opportunities for continuous learning on harvesting and collection of NWFP, product certification, etc. through, practical guides, short courses and workshops.

Photo by: © beatrice prève / Adobe Stock

A CALL FOR ACTION

4. A call for action

Non-wood forest products *— which could also be called traditional forest products, diverse forest products, wild products, or even* ***INCREDIBLE forest products*** *— are part of a common natural wealth and cultural and spiritual heritage. They have a key role in cusine, handicraft traditions, recreation and wellbeing.*

NWFP contribute to livelihoods and healthy diets in many parts of the world, as well as to healthier lifestyles, stimulating people to take part in outdoor activities and to experience nature. Some NWFP are important natural resources that support sustainable bioeconomy value chains, green jobs, the creation of reduced carbon-footprint and renewable products and that help rebuilding a post-COVID-19 Europe. As a whole, NWFP can play an important role in the implementation of the European Green Deal, helping to unlock the potential of nature-based solutions, reconnecting society with forests and forestry, and helping to tackle some of our global challenges, towards a climate-neutral, nature-positive, inclusive economy, and actively managed, resilient landscapes.

While NWFP are generally well appreciated, **their large potential is not always fully recognised.** As a matter of fact, their production volumes, geographic areas and differential qualities, consumption and trade patterns, and conservation status are — with some exceptions — “well-known unknowns”. This knowledge gap explains the limited policy attention they receive, and a frequently reported mismatch between sectoral policies and the needs or opportunities identified by operators, that hampers public, collective and private actions. Even within forestry regulations, NWFP are normally placed in a secondary role compared to wood production or carbon sequestration.

The lack of effective and concerted action hampers the full development of NWFP-based solutions to better address societal challenges. It reduces the capacity to cope with climate and social change, to avoid ecosystem degradation and to create sustainable livelihoods. Moreover, in a context of globalisation and increased demand for food, feed and raw materials, it also jeopardises efforts to tackle unwanted land-use change and unsustainable and unfair exploitation, often based on unmonitored collection, uncontrolled markets and illegal trade.

This white paper is a call for supportive policy action, because action is needed at all levels and by many different actors. Specifically, it addresses governments and parliaments, as they have the greatest opportunity to change course. It provides legislators and decision-makers with information to support them to recognise NWFP as part of the collective heritage, as natural resources that require active management and appropriate attention, and as a diverse array of relevant, but mostly informal economic sectors that will benefit from more coherent policy frameworks. Governments can propose legislation based on their specific circumstances to regulate picking and harvesting activities where appropriate, labour conditions, taxation, trade, etc. in order to secure rights for producers and consumers, to understand the potential of informal collection and self- consumption, and to transition towards transparent markets and knowledge-based strategic decision making.

Particularly, the European Commission is well placed to lead a process to identify the most promising produced, collected and consumed NWFP, clarify the production systems (e.g. farmed, semi-wild or wild products), and ensure adequate collection of data and product labelling according to international standards. This would establish the basis for co-creation, with member states and stakeholders, of European wide programmes for key NWFP. In addition, the European Commission could better address and enhance the traceability of wild food products, and incorporate NWFP in the Forest Information System for Europe and the Farm Sustainability Data Network.

However, it is not all about regulation and governmental action. All stakeholders have a role to play. Market operators can share information and data on production/collection, processing and trade. They must comply with regulation, meet required standards, and are encouraged to implement transparent due-diligence procedures. In addition, they can partake in voluntary certification schemes, to secure sustainability, traceability and fair benefit sharing. Producers and other operators can integrate into different types of organisations, such as associations, cooperatives, or interbranch organisations, in order to strengthen the bonds along and across the value chains, enhancing transparency, fairness and trust. Local development agencies and agricultural and forestry advisory services could take an active role to address NWFP-related knowledge and technology gaps, and to better support NWFP-based development opportunities. The research community and international organisations should support all these efforts, enhancing coordination across countries to address relevant knowledge gaps, and support training, knowledge transfer and awareness raising activities. NGOs can advocate, facilitate, and encourage action, while consumers can be better informed and empower themselves to factor elements of origin, quality, sustainability, and fairness in their purchase decisions.

Above all, the onus is on all stakeholders to pursue shared visions on desirable, sustainable and plausible futures, to advance with empathy towards a common understanding on the inter-linkages between nature conservation and sustainable forest and land management, and to reflect collectively on the consumption and production patterns that will help us advance towards a sustainable and circular bioeconomy.

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KNOWLEDGE TO ACTION

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